the OIL AND GAS JOURNAL

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To assure the continued improvement of its bits, Hughes is intensifying its extensive field and laboratory research program, now in its 4 1th year.

HUGHES TOOL COMPANY · Houston, Texas

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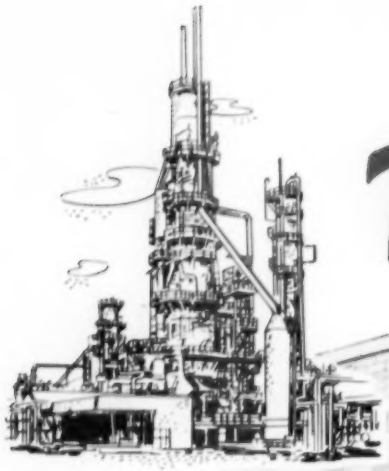

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the OIL AND GAS JOURNAL

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In Brief...

1. IMPROVED PROCESSING . . . International Refineries' Wrenshall, Minn., plant is an example of combination processing in that crude oil comes into the plant and finished products are sent to storage with elimination of the usual intermediate storage. All processing units are controlled from a single, graphic panel board. The Model IV cat cracker instrumentation employs two unusual cascade systems for temperature and pressure control.

2. BETTER LUBE QUALITY . . . Lube hydrofining can be economically applied to the refining of low-cost lubricants, either replacing acid treating or used as final processing to insure uniformity of color and other properties. Advantages include: (1) Operation is continuous using relatively simple equipment; (2) finished oil yield on feed exceeds 99.5 per cent; (3) there are no major waste-disposal problems; (4) physical properties are improved; and (5) uniform-quality lube can be produced from varying crude sources.

3. EFFICIENT FIELD WELDING . . . Satisfactory stub welds can be made at field machine shops. Reasonable factors of safety can be provided over the strength of the drill-collar pin and box connection if proper welding procedures are used. Most important of these are: (1) Weld must be free of inclusions or defects; (2) proper preheat and stress relief are very essential, and (3) a proper design using a backup plug or ferrule to eliminate the first bead and to provide a smooth bore is advantageous.

4. NEW GEOLOGICAL CONCEPTS . . . Drilling in South Boling oil field, Wharton County, Texas, has shown the Frio sands underlie a Jackson (Eocene) shale section as much as 1,000 ft. thick. The presence of multiple thick, highly permeable, and porous Frio oil sands underneath this great thickness of older Jackson shale revealed the existence of a thrust fault, a heretofore unrecognized Gulf Coastal geological condition. The Boling thrust fault may open many thousands of so-called condemned acres of pierce-ment-type salt-dome flanks for reexploration.

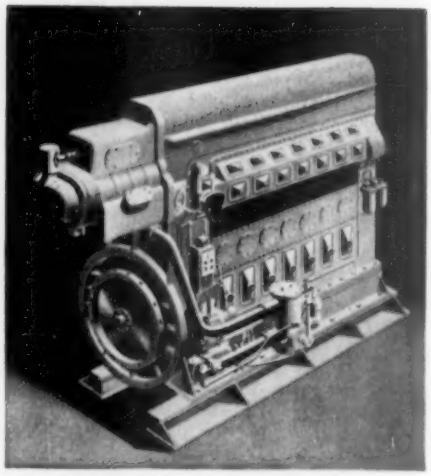
"...who needs O-P?"

Not this bird . . . but he's the only driller that can't cash in on the advantages of the Fairbanks-Morse Opposed-Piston diesels.

O-P was an early bird in the oil fields too . . . in 1938 an F-M Model 38 powered the rig on the deepest well ever drilled by diesel power up to that time. Deeper wells have been drilled, but no other diesel can yet approach the dependability, compactness and economical maintenance record of the 38 O-P.

Proved Opposed-Piston design advantages are available from 320 to 2400 hp. The Model 38F 90 is especially built for continuous heavy-duty oil field service. Its welded steel frame provides maximum resistance to the stresses of transporting and severe shock loadings common to draw works operation, as well as helping to make this engine 20% smaller and lighter than any comparable engine. Opposed-Piston design also contributes to this compactness . . . and gives the added advantage of 40% fewer moving parts. To you, it means fast acceleration and far lower maintenance costs.

Add other O-P advantages—interchangeability of parts . . . three-way fuel options . . . full enclosure of working parts . . . wear-free aluminum bearings—and you've got a power package you can't afford to pass up . . . unless you're a woodpecker! Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois.



Fairbanks-Morse Model 38F 90—320 to 825 hp.

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Du Pont announces . . .

NEW TYPE lube oil additives

Starting with new engines, a representative number of taxicabs were tested in 50,000 miles of low-duty service to determine the effectiveness of Du Pont Lube Oil Additive 564. Typical results are indicated by the two sets of photographs above.

Notice the difference in sludge on the oil screen and timing gear cover on the left as compared to the clean appearance of the corresponding parts at the right. Those on the left were operated on a representative heavy-duty motor oil (for service MS and DG). The cleanliness of those on the right resulted from the use of the same base oil to which only Du Pont Lube Oil Additive 564 plus an antioxidant had been added.

. . . polymeric additives offer solution to your low-duty sludge problems

A new solution to engine oil sludge problems, particularly those caused by low-power, low-temperature, and other low-duty driving conditions is now possible. This is especially significant in helping promote your product to the mass passenger car market, and is also of interest to the operators of urban fleets—taxis, buses and delivery services.

The solution of sludge problems is available through the use of new polymeric lube oil additives by Du Pont. Being outstanding detergents and viscosity-index improvers, these double-action additives are exceptionally effective under stop-and-go driving conditions. They are especially effective in retarding sludge formation on all engine parts in contact with lubricating oil. As a result, Du Pont Polymeric Lube Oil Additives help maintain good engine lubrication and extend the useful life of your customers' engines.

Leave No Deposit

Polymeric lube oil additives, being ashless detergents, permit more efficient operation of the engine oil system. Oil screens and filters are kept clean and free from sludge. The resulting free flow of oil through the engine keeps it in better operating condition.

Cost Less Than Other Detergents

Du Pont Polymeric Lube Oil Additives are effective in low concentrations. And, when used in multi-graded oils, result in substantial savings since these new additives are both detergents and V.I. improvers. They are supplied in two molecular weights—Lube Oil Additive 564 (formerly PL-164A) and Lube Oil Additive 565 (formerly PL-164).

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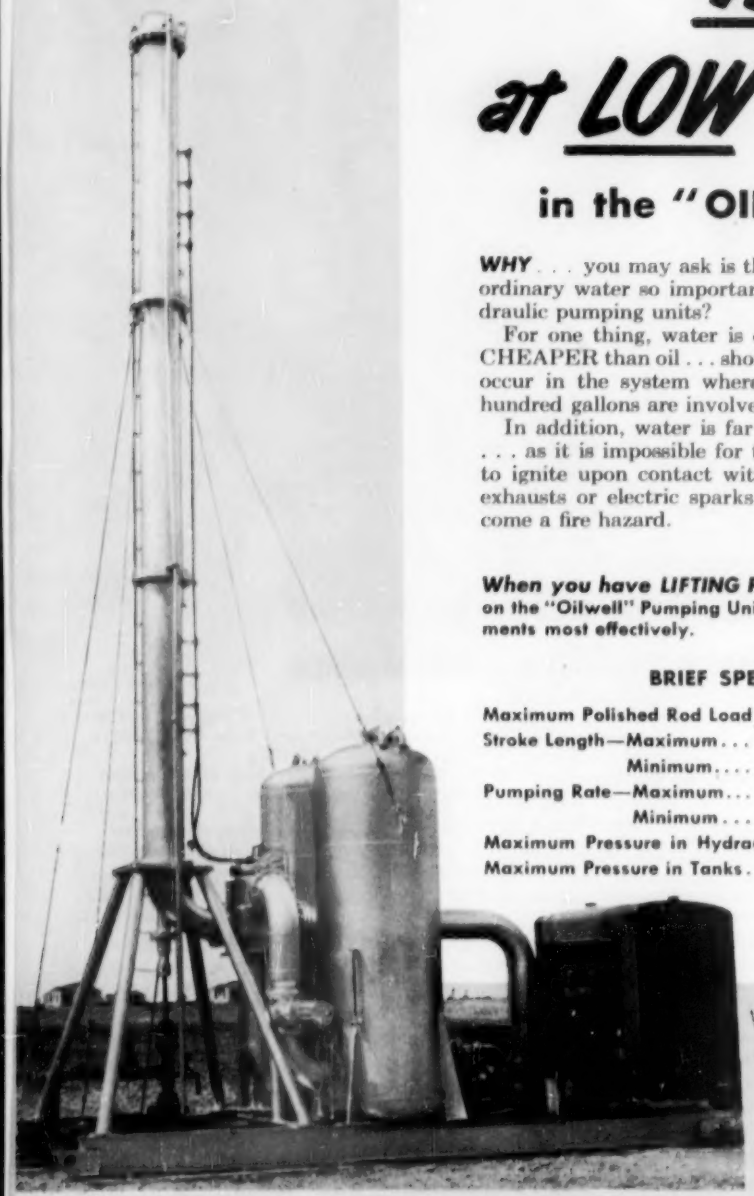
NOW ... Long-Stroke, Hydraulic Pumping Units

Operate with WATER at LOW PRESSURE

in the "OILWELL" No. 2337 Unit



WHY . . . you may ask is the use of ordinary water so important in hydraulic pumping units?

For one thing, water is certainly CHEAPER than oil . . . should leaks occur in the system where several hundred gallons are involved.

In addition, water is far SAFER . . . as it is impossible for this fluid to ignite upon contact with engine exhausts or electric sparks and become a fire hazard.

The extremely low pressure system, utilized in "Oilwell" units, further minimizes leakage possibilities and permits the use of low-head centrifugal pumps. Impulse loads, which occur at critical points in the cycle when higher pressure or positive displacement pumps are used, are thus eliminated. This produces smoother reversals and cushions the loads on all underground as well as surface equipment.

When you have LIFTING Problems . . . **let your "Oilwell" Representative quote on the "Oilwell" Pumping Unit (Hydraulic or Mechanical) that will meet your requirements most effectively.**

BRIEF SPECIFICATIONS—No. 2337 UNIT

Maximum Polished Rod Load	37,000 lbs.
Stroke Length—Maximum	22' 9"
Minimum	14' 6"
Pumping Rate—Maximum	7 s.p.m.
Minimum	4 s.p.m.
Maximum Pressure in Hydraulic Cylinder	275 p.s.i.
Maximum Pressure in Tanks	250 p.s.i.

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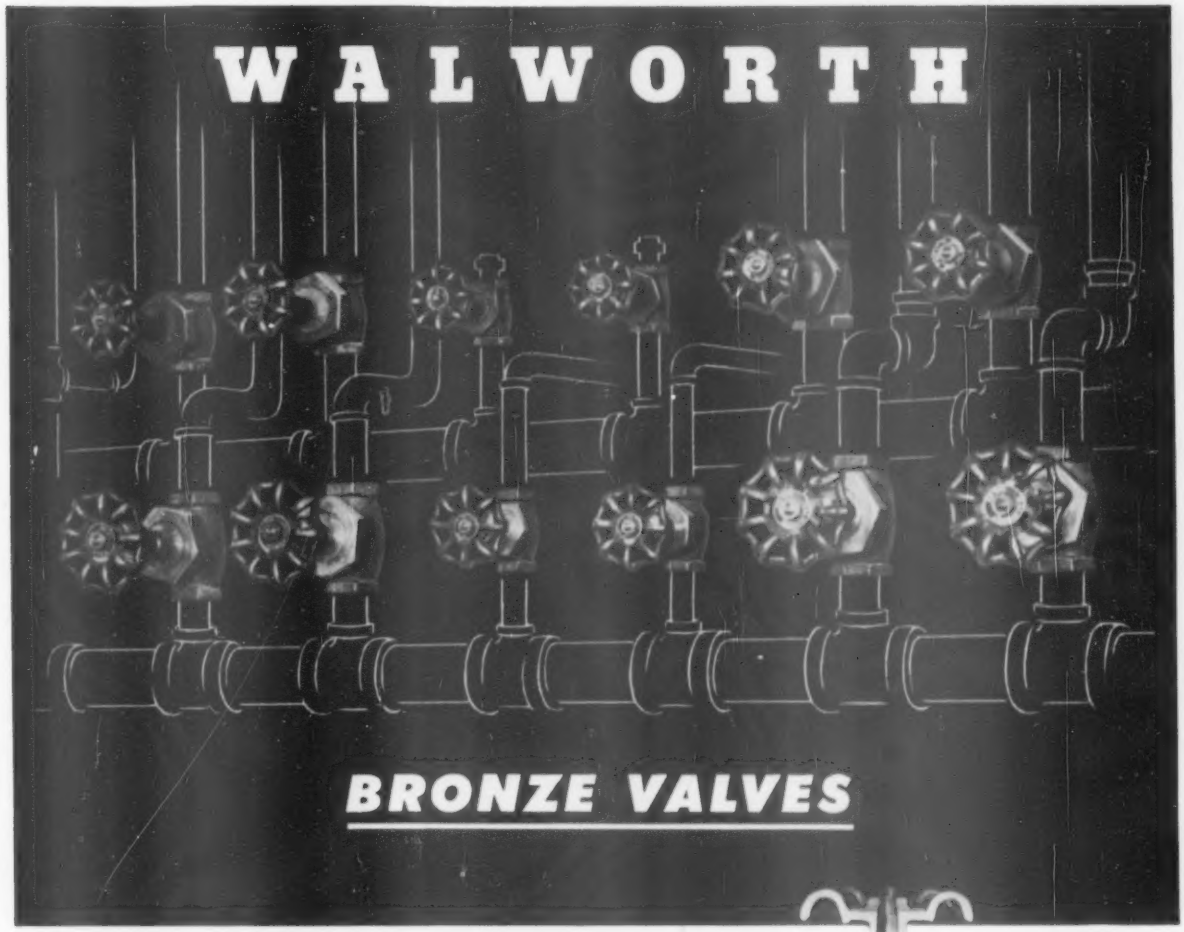
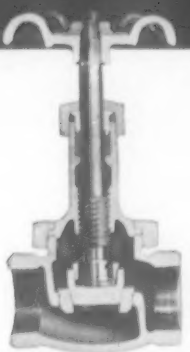


BRONZE VALVES

Better because ... **Walworth has standardized its line of bronze valves to provide an unsurpassed system of interchangeability of parts for assembly or replacement. You can maintain a great number of Walworth Bronze Valves with a small inventory of basic parts . . . you minimize part replacement problems. For further information, ask us for our Bronze Valve Standardization Chart.**



Parts are carefully machined and finished to close tolerances, thereby assuring accurate fit and alignment under all conditions. Sectioned valve is Walworth No. 225P Bronze Globe Valve with stainless steel plug-type seat and disc, heat-treated to a minimum of 500 Brinell hardness.

Choose from complete lines of Walworth Bronze Valves – including gate, globe, angle, check, and lubricated plug types. Walseal® Bronze Valves and Fittings are also available for making silver-brazed joints.

For full information on Walworth Bronze Valves and Fittings, call your Walworth Distributor, nearest Walworth Sales Office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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to unload your well in the

QUICKEST TIME

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Any load you can safely handle will come up with the "J"—the tough, heavy-duty cup that's designed to bring out everything but the tubing! Extremely durable, fast falling. No down-swabbing, no hanging on collars. Long, strong flexible lip for perfect up-stroke seal.

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"GW" Cup for last-cupful unloading of shallow wells.

The Guiberson "J" Cup will bring up anything you want to lift! Look for it in the Yellow Box!

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Sold By Leading Oil Field Supply Stores Everywhere

Better Be Safe Than Sorry!

Fire could spell ruin for this huge liquefied gas storage tank . . . *and*, for everything else within range of its highly flammable contents!

When exposed to fire, certain things are necessary. Heat transfer to storage tanks must be prevented to avoid buildup of rupturing pressure. A properly engineered Grinnell ProtectoSpray System offers effective cooling and avoidance of pressure build-up.

Should escaping gases ignite, the Grinnell Protecto-Spray System again would function effectively. The wide, evenly distributed pattern of fine water droplets would permit safe, controlled burning of the gases. Also, the water spray, even without dependence on wind, would provide sustained air movement to hasten the dilution of escaped gas . . . at the same time providing additional inert vapor to speed the dilution process.

In the event of a gas leak, even if ignition doesn't occur, the leakage must be quickly stopped. By the creation of positive air turbulence, which dilutes escaped gas and helps make the mixture too lean to burn, a Grinnell ProtectoSpray System gives a margin of safety for personnel doing this work.

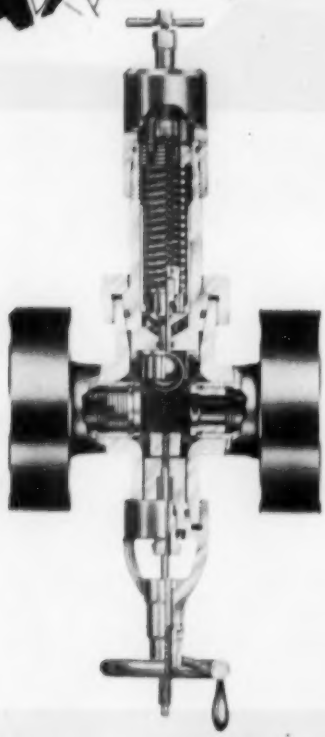
For any fire protection problem, call on Grinnell. There is a Grinnell Fire Protection System for every fire hazard. Grinnell Company, Inc., 256 West Exchange St., Providence, R. I.

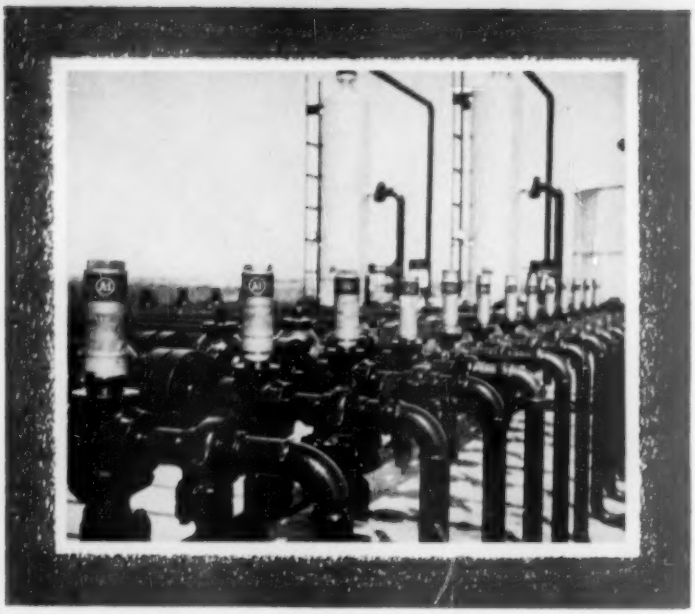
GRINNELL

PROTECTION AGAINST EVERY FIRE HAZARD

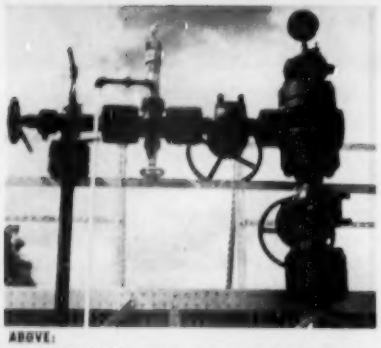
Manufacturing, Engineering and Installation of Automatic Sprinklers since 1878

A-1 HI-LO Safomatic



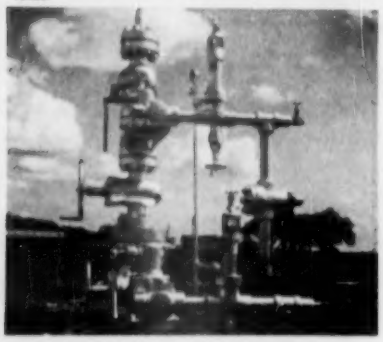


- Automatically shuts well in if pressure drops:
  Due to any downstream failure.
- Automatically shuts well in if pressure increases:
  Due to choke cutting out.
  Due to any line obstruction.
- Operating pressures from 15 to 15,000 psi.
- Corrosion resistant.
- Safety within safety.



ABOVE:
An A-1 HI-LO Safomatic valve upstream installation on a high pressure gas distillate well near Rayne, La.

BELOW:
Two A-1 HI-LO Safomatic valves upstream installations on a dual completion gas distillate well near Garwood, Texas.



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A-1

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A-1 BIT & TOOL COMPANY

P. O. Box 2133 HOUSTON, TEXAS LY-3831

SAVED $9000 PER WELL

by using new HY-T V-Belts with 3-T Cord

GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified HY-T V-BELTS
for heavy-duty, high-shock-load drives
A
B
C
A. Multiple plies of chemically produced 3-T Cord, in neutral plane, carries a 40% greater horsepower load at speeds of 100 to 6000 feet per minute with practically no stretch — permits perfect matching.
B. Cushion section of durable rubber, especially compounded to give belt balanced construction.
C. Super-tough fabric cover is bias-cut, long-wearing, weather- and oil-resistant.
NOTE: Design shown applies only to HY-T V-Belts over 120" in length. Belts under 120" are of a single layer construction and are notched for cooler running under more severe flexing.

Hy-T—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

OPERATORS of the rig shown above had big problems with the big V-belt drive on the mud pump. Constant misalignment, heavy vibration, shock loads and the attacks of oil and weather combined to hold the standard belts they were using to an average life of one well-drilling—less than three weeks. And this was before they decided to double the horsepower of the drive to increase drilling speed and lower costs.

To help with this double-barreled problem of increasing production and service, the G.T.M.—Goodyear Technical Man—was called in. He recommended new HY-T V-Belts sinewed with Triple Tempered (3-T) Cord — synthetic cord "set" at its maximum strength and resiliency by a patented, triple-action tempering involving Tension, Temperature and Time.

So strong and shock-resistant are these new super-belts that they not only permitted the doubling of horsepower to *cut drilling time by more than a week*, but are still on the job after *two years*—drilling 5 to 6 wells per year. As a result, the drillers saved an average $9000 per well in operating expenses alone for a fabulous total of $100,000 plus, with more in store. For details on super-rated HY-T V-Belts, see the G.T.M., your Goodyear Distributor or write Goodyear, Industrial Products Division, Akron 16, Ohio, or Lincoln, Nebraska.

***YOUR GOODYEAR DISTRIBUTOR** can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

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THE GREATEST NAME IN RUBBER

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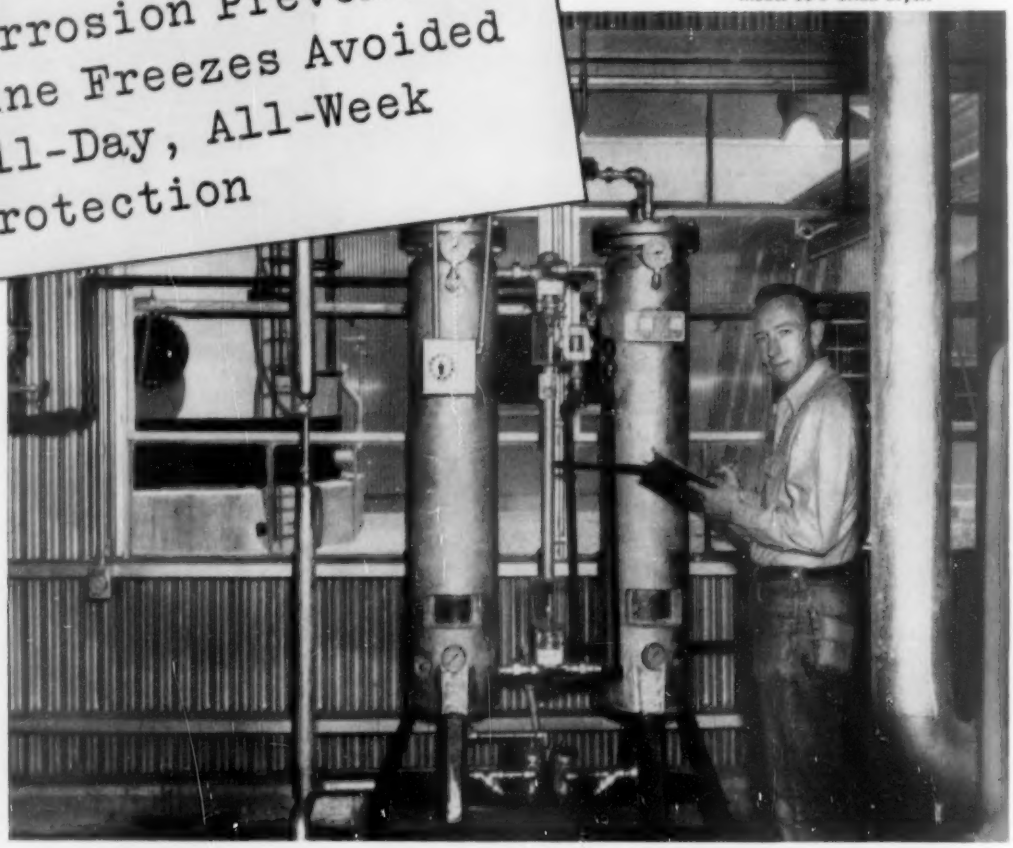
Case No. 108

Seaboard Oil Company Reports:

- Corrosion Prevented
- Line Freezes Avoided
- All-Day, All-Week Protection



Jerry Rea, plant worker, checks on the trouble-free operation of twin towers comprising Kemp Model 50-S Oriad Dryer.

Sulphur Producer Gets Automatic Drying of Compressed Air with Kemp

During their processing of sulphur and sweetening of natural gas, the Powell, Wyoming, plant of Seaboard Oil Company of Delaware needs large quantities of dried, compressed air to operate complex control instruments.

When their Silvertip Field plant was opened, the operators turned to Kemp to provide this dried air, installing a Model 50-S Kemp Dryer. The machine operates on a manual switching and automatic timing device. Imbedded steam coils reactivate the towers . . . permitting 25 cfm capacity at an exit pressure of 50 psi. The installation is operating 24 hours a day on a seven-day week — preventing corrosion and avoiding costly delays caused by line freezes in the plant.

If drying air or other gases is a problem in your operation, it will pay you to discuss your problems with a Kemp Engineer. He can recommend specific equipment to handle your specific problem . . . and give you the benefits of *every* Kemp installation—simplicity of operation and maintenance, low installation cost and minimum maintenance expense. A Kemp Engineer is ready to discuss your needs—without obligation.

For detailed, technical information, ask for Bulletin No. D-29. Write to:
C. M. KEMP MFG. CO., 405 E. Oliver Street, Baltimore 2, Maryland

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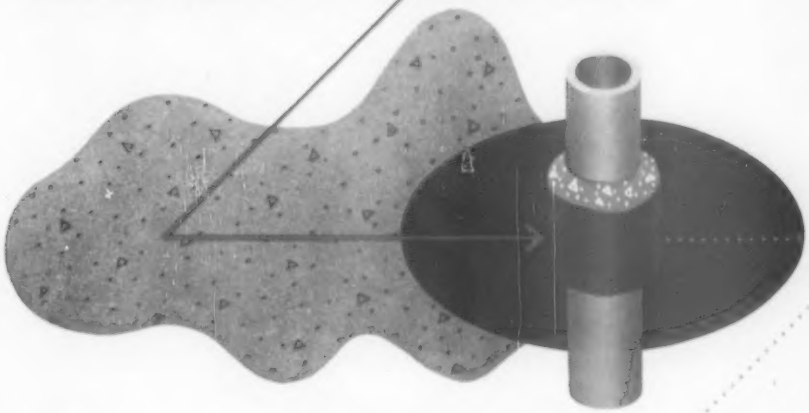


HALLIBURTON'S *NEW* DOC

(DIESEL OIL CEMENT)

Success in the field is the only real proof of a new product. And Halliburton's DOC, the successful cement for many "problem" wells, has been *proved* a necessary product for modern remedial work.

Take, for example, the Gulf Coast well that was pumping 100% water. Two squeeze jobs with a water-cement slurry couldn't slow the flow. Then DOC was squeezed with good pressure being obtained on a relatively small volume. The result —179 BOPD with no water. And here are more results that have proved DOC . . .

An Oklahoma well was treated with DOC and production changed from a show and 500 bbl. of water to 20 BOPD and no water. Another Oklahoma well was producing 60 bbl. of oil and 40 bbl. of water a day, but after being squeezed with DOC, the production was 70 bbl. of pipe-line oil a day. Kansas wells, in the destructive Dakota water zones, have responded to DOC where ordinary slurries were washed away before setting. Squeeze jobs with DOC often have shown complete shut-off of unwanted water with just one application.

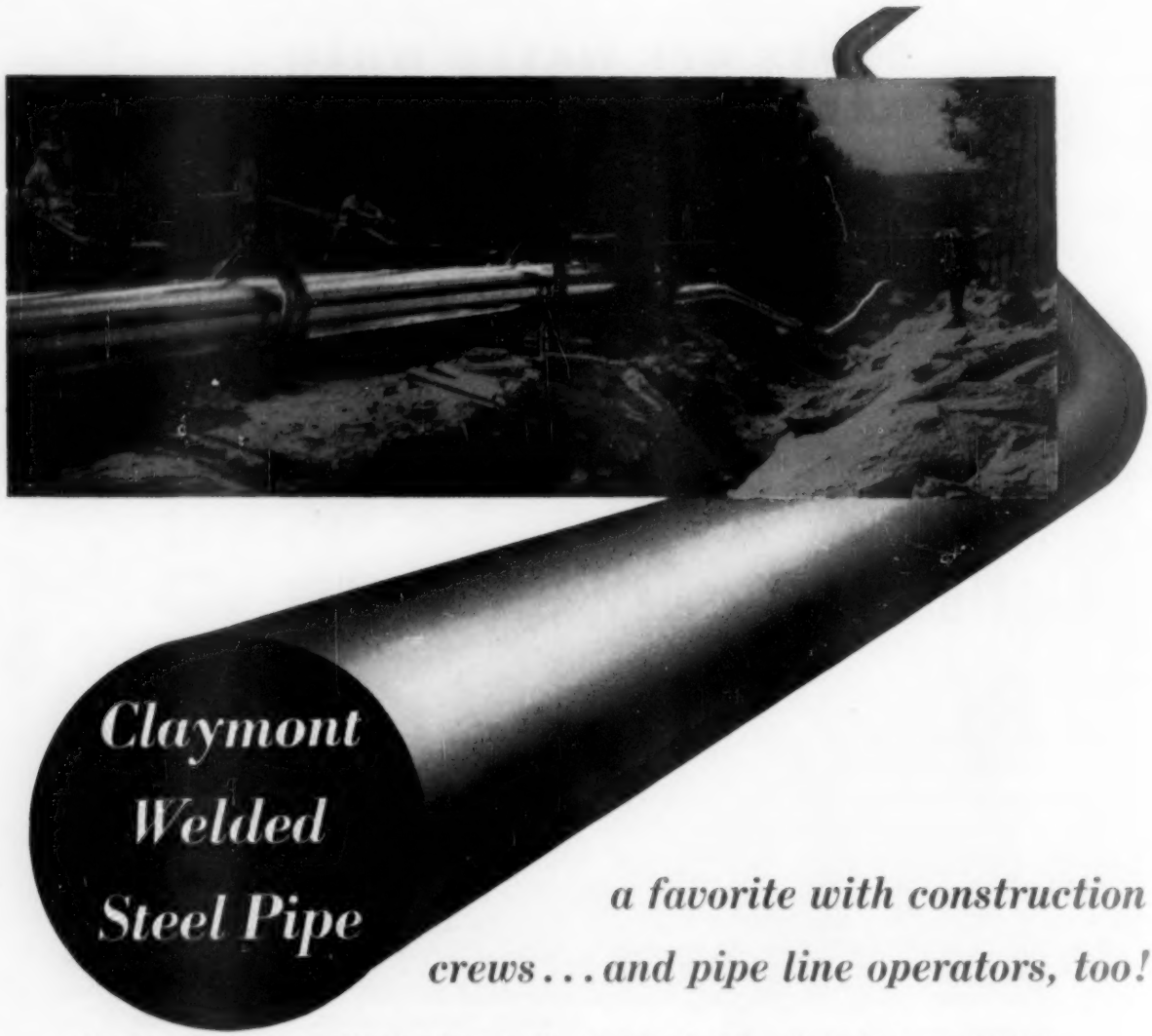
A *surfactant* plus cement in a diesel oil slurry makes possible results like these. The surfactant allows twice as much cement in a given amount of oil for a heavier slurry that is still easily workable at deep hole depths. The dispersing and suspending properties of the surfactant have given pumpable slurry weights as high as 16.2 lbs. per gal. which gives a denser set material of high compressive strength.

The production-boosting results are the proof of DOC's effectiveness. On your operation, let DOC help shut down unwanted and bottom water, and help step up production. You can use DOC with confidence, because it is the new, *proved* product! Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING



Claymont Welded Steel Pipe

a favorite with construction crews . . . and pipe line operators, too!

Claymont Welded Steel Pipe is a favorite of pipe line construction crews. They like the way that Claymont pipe is easy to bend and weld . . . the way the ends are precision bevelled for accurate fitting . . . the way that Claymont Pipe is always uniform in size, straightness and roundness.

Pipe line operators like Claymont Welded Steel Pipe, too! They know that they will get long, trouble-free pipe line life with Claymont pipe because it is made from high tensile, highly ductile steel plate produced in Claymont's own plant and carefully controlled through every stage of production.

Claymont Welded Steel Pipe is regularly furnished in 40′ lengths with outside diameters of 22″ through 36″ and with wall thicknesses from ¼″ through ½″. Special lengths, diameters and thicknesses available on request. For complete information, contact Claymont Steel Products Department, The Colorado Fuel and Iron Corp., 813 West St., Wilmington 99, Del.

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CF&I

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2681

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OTHER CLAYMONT PRODUCTS

Carbon and Alloy Steel Plates • Flanged and Dished Heads • Manhole Fittings and Covers • Stainless-Clad Plates
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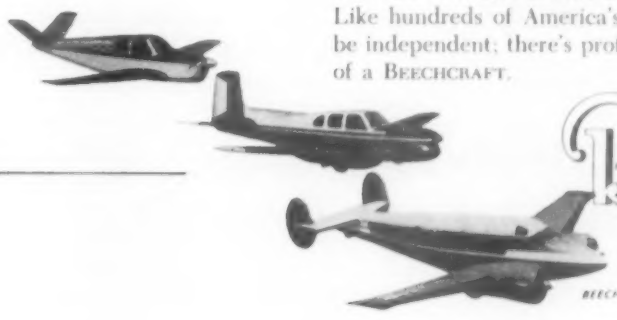
You, too, can be Independent

The time it takes to travel somewhere has long been the limiting factor for many busy men and women.

But when business puts a BEECHCRAFT on the company payroll, distant business and pleasure appointments are only short hours away . . . and there's a thrill in going places as you travel on your own schedules, at your own convenience, in a fast, comfortable hurry.

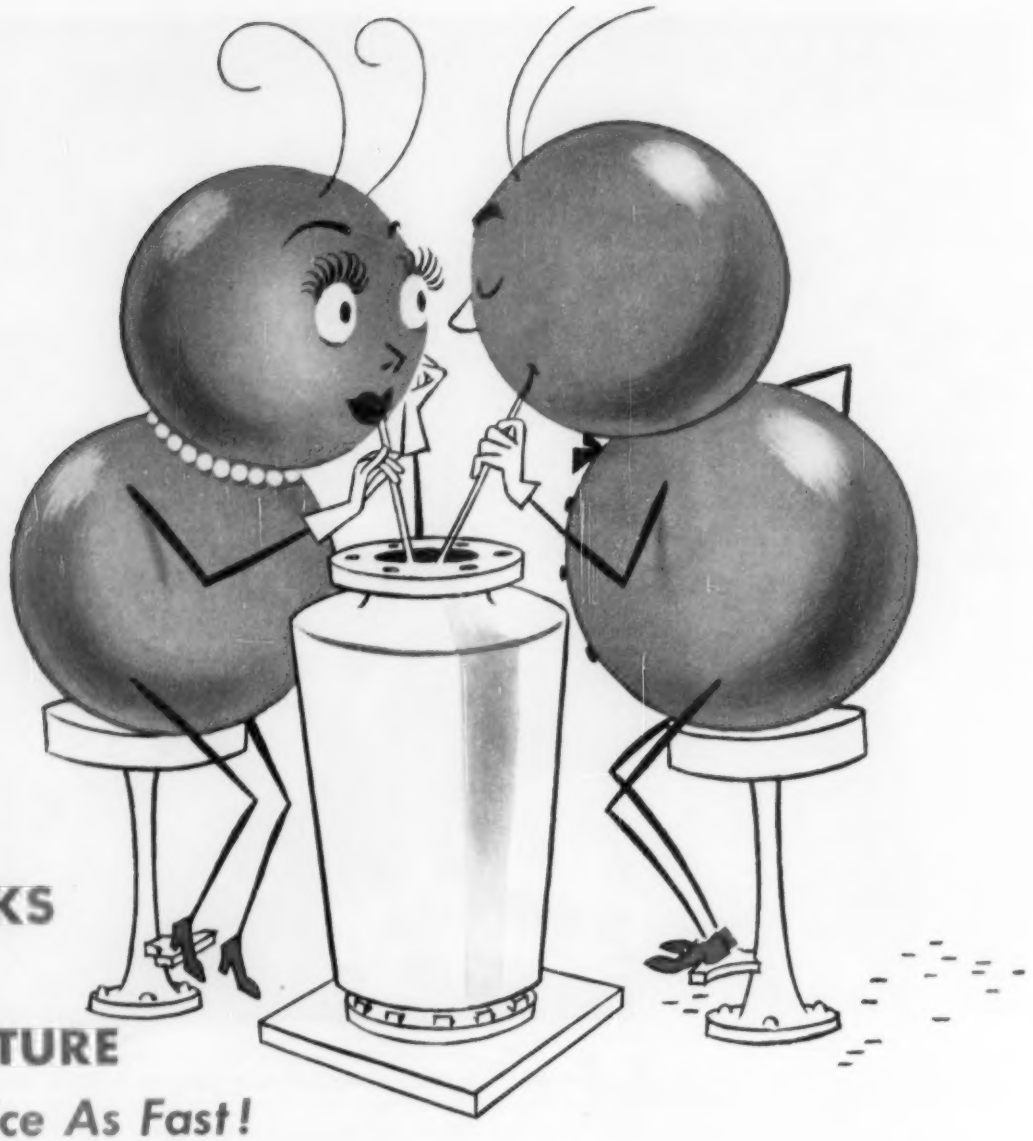
With travel time reduced as much as 75 per cent, the time saved can be spent on the things you want to do most. Your business can be run more efficiently with less lost motion. You can even save a little time for relaxation and recreation. Like hundreds of America's foremost industrialists, you can be independent; there's profit and pleasure in the ownership of a BEECHCRAFT.



Beechcraft

Beech Aircraft Corporation,
Wichita, Kansas, U. S. A.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



DRINKS UP MOISTURE

Twice As Fast!

Use S/V Sovabead in Your Dehydrator!

Ever watch two thirsty kids go to work on one soda? That's how fast S/V Sovabead drinks up moisture. It can almost *double* your dehydrator efficiency. And it stays just as thirsty at temperatures up to 120°F!

What's more, S/V Sovabead eliminates caking...reduces channeling, dusting and pressure drops. It also provides longer dessicant bed life...can be reactivated fast and economically.

Put *S/V Sovabead* to work in your dehydrator. Your Socony-Vacuum representative can tell you all about it.

SOCONY-VACUUM
process products

Process Products

SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

J&L SpringKore is the first wire rope that gives rotary drillers outstanding flexibility, resistance to crushing and economy all in one rope.

A new principle in Wire Rope construction, SpringKore has just what the name implies, a center consisting of a tightly coiled high quality steel spring. The outer strands are laid up around this uniform, highly flexible, crush resistant center—in standard J&L rotary drilling line constructions. Where the severe crushing action of rotary drilling distorts ordinary drilling lines, SpringKore's diameter stays uniform longer. Clearance between strands is maintained, resulting in greater flexibility and increased fatigue life. Finally, the hollow center of the coiled spring acts as a reservoir for lubricants to reduce internal wear and corrosion.

In the field SpringKore has already proved it has resiliency and toughness unequaled in wire ropes of equivalent strength and cost. The result: operating *economy* that's measured in terms of more hole per wire rope dollar.

J&L STEEL **Jones & Laughlin**
STEEL CORPORATION — *Pittsburgh*

Here's what you get with SpringKore:

- **Long term flexibility**
- **Resistance to crushing action**
- **Complete lubrication**
- **More supporting contact points**
- **Uniform diameter**
- **Better spooling**
- **Less inside wear**

Fill in the Coupon and Let's Get Together!

Jones & Laughlin Steel Corporation
416 Gateway Center, Pittsburgh 30, Pa.

☐ Send me a free copy of your booklet "J&L SpringKore Wire Rope."

☐ Please have your nearest representative call.

Name_____ Title_____

Company_____

Address_____

The Biggest News in tank cars since the all-welded car!

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DURADOME

Flued Dome Tank Car

A million-dollar press was needed to make this new car possible! And yet—whether you follow the trend to leasing, or whether you buy—you get DURADOME benefits at *no extra cost.* Stronger . . . easier to clean . . . easier to apply lining. Get *all* the facts on the new DURADOME now from your Shippers' representative.

COPR. 1954 S. C. L. C.

improved 4 ways

1. ***Flued Dome*** . . . dome base actually pressed out of heavy steel plate—eliminating fillet welds and dome shelf for greater structural strength and corrosion resistance.

2. ***Pressure-type Construction*** . . . uses complete "ring-sections" or cylinders to build up the tank. That means heavier steel *all* the way around for greater durability.

3. ***All-welded Insulation Jacket*** (when required) . . . angles and bolts completely eliminated. Streamlined—more weatherproof—needs less maintenance.

4. ***Standardized Underframe*** . . . the same, all-welded underframe for tanks of all standard types and capacities. Provides flexibility of use; more economical maintenance!

The DURADOME car is available for lease or sale through . . .

SHIPPERS S H P X CAR LINE

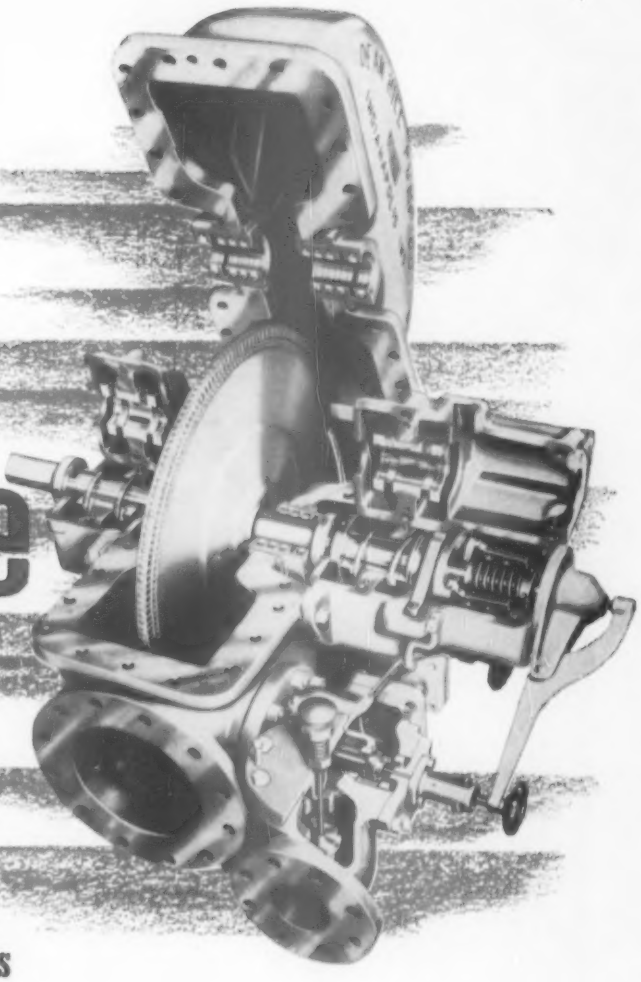
SHIPPERS' CAR LINE CORPORATION

30 Church Street, New York 7, N. Y.

A subsidiary of acf INDUSTRIES Incorporated

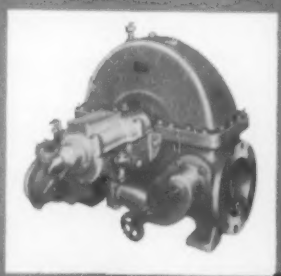
CHICAGO, ILL. • HOUSTON, TEX. • SAN FRANCISCO, CAL. • MILTON, PA. • EAST ST. LOUIS, ILL. • SMACKOVER, ARK. • TULSA, OKLA. • NORTH KANSAS CITY, MO.

up to 100% more power



added to DH turbines

More power from the same size unit! Dean Hill presents an improved DH Line of horizontal turbines which produce up to twice the power of former counterparts.



The major change contributing to this tremendous power increase is the addition of one or more steam nozzles to all models, with these results . . .

1. The new, two-nozzle DH-10 and DH-20 turbines have *double* the maximum horsepower of former units.

2. Models DH-30, DH-40 and DH-45, now with three nozzles, are rated 50% higher in maximum horsepower.

FULL INFORMATION AVAILABLE

Many other improvements have been made on the five DH Models, adding to the quality and performance of Dean Hill Horizontal Turbines. A new catalog completely describes these models, and this information will be sent you on request.

Write Today For Dean Hill's New Turbine Catalog No. 500.

DEAN DH HILL PUMP COMPANY

Pump and Turbine Engineers Since 1893

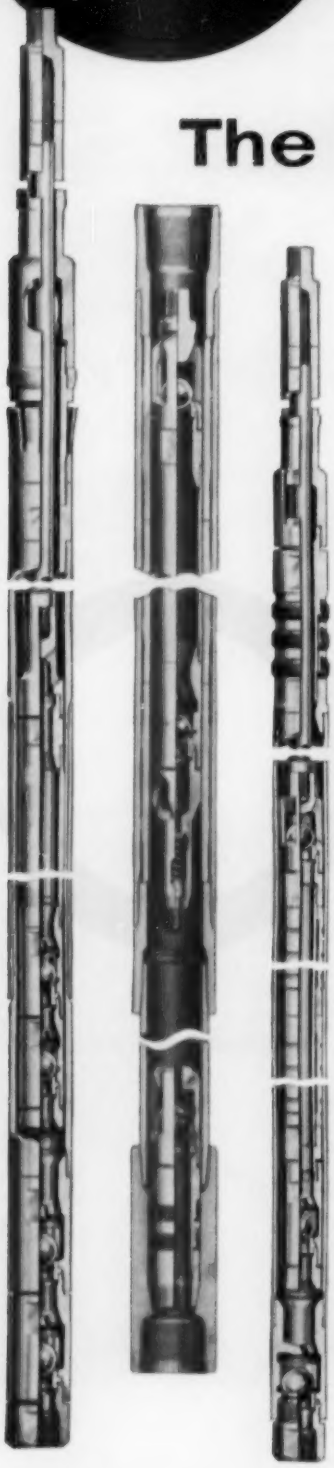
Indianapolis 7, Indiana

Sales Offices In:

Chicago, New York, San Francisco, Boston, Cincinnati, Denver, Albuquerque, El Paso, Salt Lake City, New Orleans, Philadelphia, Tulsa, Los Angeles, Pittsburgh, Houston, Dallas, St. Paul, Toledo, Cleveland, Grand Rapids, Birmingham, Ala., Louisville, Memphis, Nashville, Richmond, Eugene, Ore., Mexico City, Montreal, Renfrew, Pa., The Hague

They're Ready!

The New Bethlehem *Beeline* Subsurface Pumps



Here's important news for production men: Bethlehem Supply now offers a brand-new, up-to-the-minute line of subsurface pumps, marketed under the trade name *Beeline*.

As you'd expect, Beeline pumps are built to the same high standards that characterize all Bethlehem products. Components are made to extremely close tolerances; rigid controls assure precision, long life, and complete conformity to API requirements.

You can obtain these sectional-liner pumps, rod full-barrel pumps, and three-tube pumps with many combinations of fittings and optional equipment. The proper Beeline unit can be furnished for any well condition. Regardless of your problem, there is a pump that will exactly meet your needs.

And here's another point — a big one. In major production areas of the oil country, Bethlehem maintains fully-staffed service shops, where mechanical work is handled by expert pump men. There you're assured of a first-class job. Complete assortments of parts are always on hand, and the service is *fast*.

Now that the Beeline pumps are available in every major field, it is possible to "go Bethlehem" all the way . . . from the surface to the bottom of the hole. There is no better combination than Bethlehem beam pumpers, sucker rods, and subsurface pumps. Call us for definite recommendations.

BETHLEHEM SUPPLY COMPANY

General Offices:
21 E. Second St., Tulsa, Okla.

West Coast Headquarters:
Los Angeles, Calif.

Export Distributor:
Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

Three of the several types of Bethlehem Beeline Pumps.

BIG CAPACITY—
LITTLE BULK AND
WEIGHT
Cast aside the idea that you need a bulky, heavy meter to handle 415 cfh loads. Cast your eyes on the Rockwell "415". It's housed in a trim, sturdy aluminum alloy case. The entire unit weighs only 19½ lb. One man can easily hold it aloft to install.
The bowl type body with single joint construction minimizes leakage risks. To simplify service there's the quickly removable and interchangeable valve plate assembly. For a new appreciation of measurement at its finest, see . . .
CUBIC FEET
415 METER
The Rockwell "415"
• FOR APARTMENT HOUSES
• SMALL INDUSTRIALS
• SCHOOLS, SHOPS, ETC.
ROCKWELL Aluminum METERS

ROCKWELL "015" Regulators

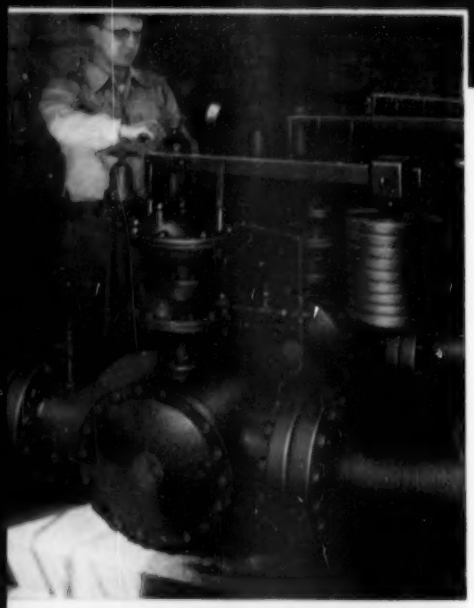
BRING

Precise Control

WITH

Complete Safety

Pilot loaded Rockwell high pressure regulators with auxiliary spring control.



Operator adjusts pilot loading pressure on Rockwell "015" regulator fitted with auxiliary lever and weight control.

DUAL CONTROL SYSTEMS *DO THE TRICK!*

Rockwell *power pilot* regulators are available with two types of built-in auxiliary controls—spring, and lever and weight. In either case the auxiliary system is non-operative when the pilot loader is functioning normally. It takes over automatically should the inlet pressure fall below the setting of the pilot control. For complete safety, the auxiliary system serves to take over the regulating job should the pilot loader become inoperative. Write for bulletin 1086.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Dallas Houston Kansas City, Mo. Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle Tulsa

In Canada: Peacock Brothers Limited

YOU CAN RELY ON ROCKWELL

There's a ROCKWELL METER and REGULATOR for every use

METERS

REGULATORS

We'll take CABOT!

Cabot is a sensible pumping unit, every part functional.

Where the pitman joins the walking beam, conventional parts have been replaced with a rubber bearing which absorbs shocks, spurns lubrication, and materially lowers the maximum polish rod load. This EQUALASTIC* BEARING is patented, and therefore exclusive.

Crank balancing is a simple one-man job — literally!

The reducers are the best we have seen, and interchangeable. The gears are Sykes-cut herringbone; the bearings Timken and Hyatt. Flood oiling is automatic, and so self-contained that seals on the shafts are eliminated.

After 49 years in a front-row seat at the evolution of pumping equipment, today we'll vote the Oscar to Cabot without hesitation.

Ask for bulletins

*Trade Mark Reg. U. S. Pat. Off.

J&L STEEL

"...here's MY warehouse!"

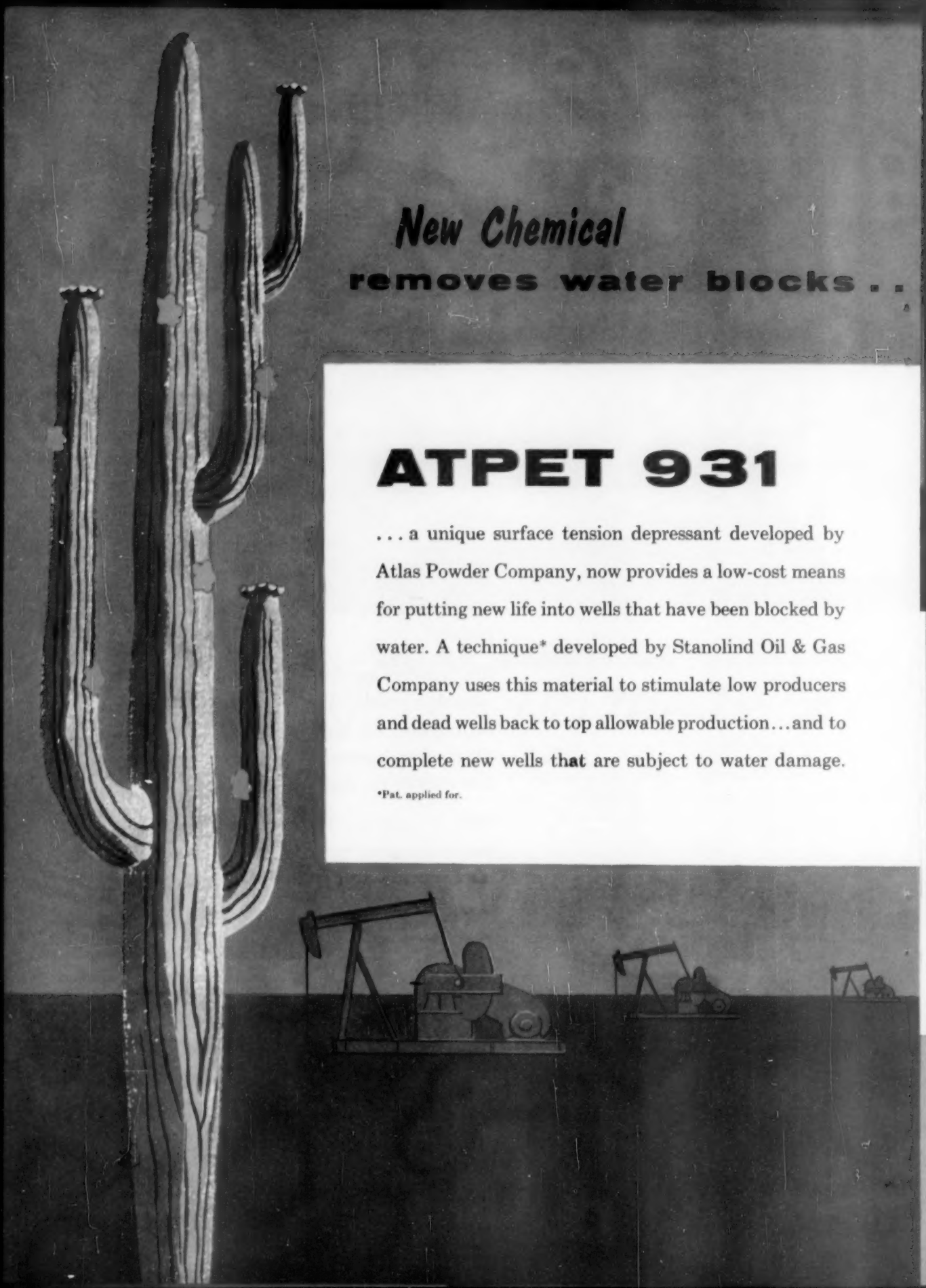
Jones & Laughlin STEEL CORPORATION

SUPPLY DIVISION – TULSA, OKLAHOMA

Serving The United States and Canada

P·E·S·A

PARTNERS IN PETROLEUM PROGRESS


New Chemical
removes water blocks . .
ATPET 931
. . . a unique surface tension depressant developed by Atlas Powder Company, now provides a low-cost means for putting new life into wells that have been blocked by water. A technique* developed by Stanolind Oil & Gas Company uses this material to stimulate low producers and dead wells back to top allowable production . . . and to complete new wells that are subject to water damage.
*Pat. applied for.

. . . economically

Pays out quickly

The cost of using ATPET 931 is exceptionally low. From 10 to 100 gallons of the chemical, mixed at about 1% in field crude, are forced back into the producing formation. ATPET 931 removes the water block by reducing the interfacial tension between oil and the water that invaded the formation . . . and oil flow is restored.

Not only is the cost of materials low, but the process itself costs little to apply . . . requires only minimum pumping equipment. Payout time is measured in days instead of months. Production improvement is usually observed immediately and some have continued to improve over several months.

Here are a few examples of what ATPET 931 is doing:

- A Gulf Coast well that had gone dry was brought back to production of top allowable of 68 BOPD after treatment with 20 gallons of ATPET 931 in 20 barrels of oil.
- A well completed in Discorbis sand in 1940 had been worked over several times without success. It looked like a hopeless case . . . but when the formation was stimulated with 10 gallons of ATPET 931 in 1000 gallons of crude, the well returned to production. It is still producing top allowable of 42 BOPD.
- A West Texas well in the Greyburg formation was producing 12 BOPD. After treatment with ATPET 931, production increased immediately to 40 BOPD and four months later had risen to 47 BOPD.

Valuable for Well Completions, Too

ATPET 931 can prove helpful in completing new wells where water sensitive formations are encountered . . . with fracturing jobs to aid effectiveness . . . ahead of cementing operations to prevent water damage . . . ahead of acid jobs to aid recovery of spent acid . . . ahead of well logging operations where the hole must be loaded with water, as an aid to regaining production.

CHEMICALS DEPARTMENT

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE

ATLAS POWDER COMPANY, CANADA, LTD.
BRANTFORD, CANADA

ATPET 931 is non-ionic; gives excellent performance in the presence of oil field waters and brines, and has little tendency to plate out on solid surfaces. Write your nearest Atlas office for samples and further information.

BOSTON, MASS.
405 Garden Building
250 Boylston Street
KEnmore 6-7817

CHICAGO, ILLINOIS
1605 Field Building
135 S. LaSalle Street
FRanklin 2-9530

HOUSTON, TEXAS
Suite 128
3272 Westheimer Rd.
Justin 5561

LOS ANGELES, CALIF.
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NEW YORK, N. Y.
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VAnderbilt 6-1730

ST. LOUIS, MO.
402 Continental Bldg.
3615 Olive Street
JEfferson 3-2538

SAN FRANCISCO, CALIF.
807 Crocker First National Bank Bldg.
1 Montgomery Street
GArfield 1-8640

• We put the piping inside, out of the cold... and solved the problem of Treater Operation in COLD Climates

PARKERSBURG
Winterized Treaters

Putting the piping inside the treater has brought about important advantages that solve the problems of treater operation in cold climates and resulted in more efficient performance in any weather.

Radiation loss is substantially reduced because inlet and discharge pipes are inside and rise to the top of the treater.

Discharge water is protected from freezing because weir box and discharge pipe are inside the treater.

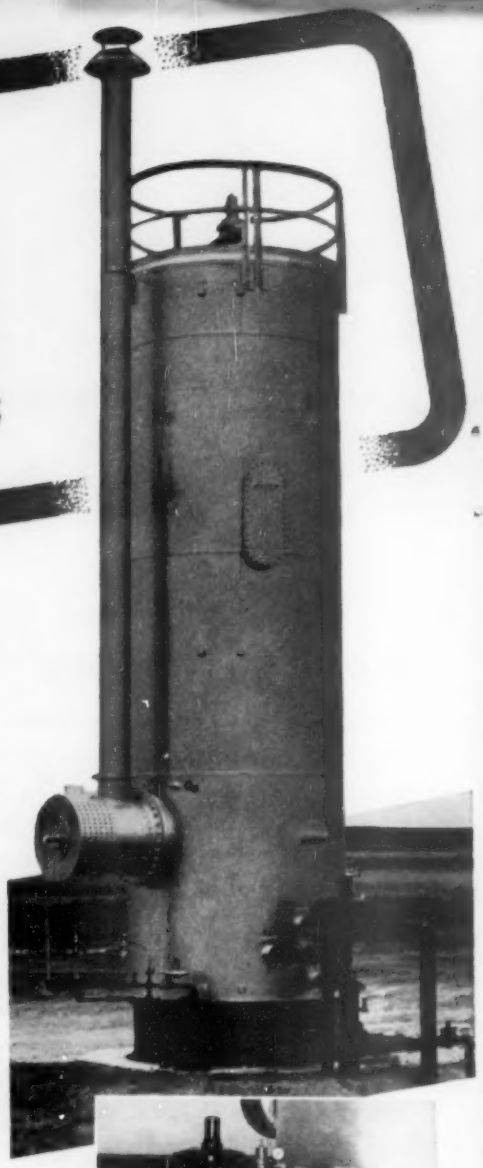
All connections are grouped close to the firebox which not only simplifies hook-up, but makes it easy to house the controls for protection against cold weather.

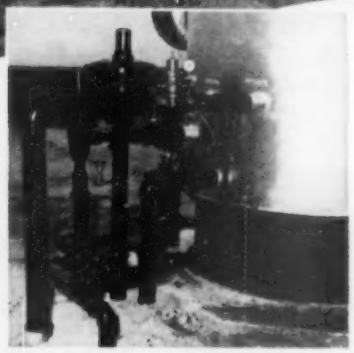
Additional pre-heating of the incoming emulsion takes place as it travels from bottom to top of treater through a pipe in the hot water and oil.

Increased water capacity with less heat loss to the water has been achieved by a rearrangement of the fire tube.

Internal heat exchanger can be furnished to enclose the emulsion inlet and clean oil outlet piping. Outside heat exchanger and pre-heaters are also available.

• *Ask your Parkersburg Representative about the solution to emulsion treating problems in cold climates with a Parkersburg Winterized Emulsion Treater.*





• Note the grouping of connections, valves and controls near the fire-box and at ground level. They are easily and economically housed for protection against weather.

5426

THE PARKERSBURG RIG & REEL COMPANY • PARKERSBURG, WEST VIRGINIA

Division of Parkersburg-Aetna Corporation

PRESSURE EQUIPMENT

SEPARATORS • HYRECO • DEHYDRATORS • KNOCKOUTS • SCRUBBERS • TREATERS • HEATERS

AVAILABLE JOHNSTON by AL CAPP

WHO IS YO', AN' WHAR IS YO' GOIN'?
AH IS AVAILABLE, AN' HE IS ACCURATE JOHNSTON – AN' WE IS GOIN' T' TEST A OIL WELL!!
SMACK OUT HERE, IN TH' OCEAN?
YAS'M!! – US JOHNSTONS TEST OIL WELLS, ANY-WHAR, ANY TIME – AN' FAST!!
COME BACK!! TELL ME MORE!!
CAIN'T, MA'M!! – WHEN WE GO OUT T' TEST A WELL, WE CUTS LOST DOWN-TIME TO A MINNY-MUM!!

C-548

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

KRALASTIC® PIPE eliminates all this!

Kralastic rubber-resin, one of the first materials to produce successful plastics pipe, offers you a combination of money-saving advantages *no other pipe material can match!*

Kralastic pipe can't rust! No matter how muddy or acid the soil, Kralastic pipe is completely unaffected. Because it is a natural electric insulator, it ends all need for pipe coating, wrapping, or cathodic protection.

Kralastic pipe is lightweight! Half a dozen or more 20' lengths of pipe, with all the necessary fittings, can easily be carried by one man. There's no waste of time, men, and equipment with Kralastic.

Kralastic can be solvent welded! Just one man with a paintbrush makes up fittings in seconds. No threading necessary. And Kralastic pipe can be cut to length with a few quick hacksaw strokes.

What's more, Kralastic is one of the *toughest* of all plastics. And it has sufficient flexibility to follow uneven ground contours, and even to be snaked through existing lines!

You'd better investigate Kralastic pipe—the *superior* pipe for the transport of petroleum crude, *natural gas*, water, brine, and a variety of chemicals. Why not write to us today?

50th ANNIVERSARY 1904 1954 NAUGATUCK CHEMICAL

Naugatuck Chemical

Division of United States Rubber Company

489 ELM STREET, NAUGATUCK, CONNECTICUT

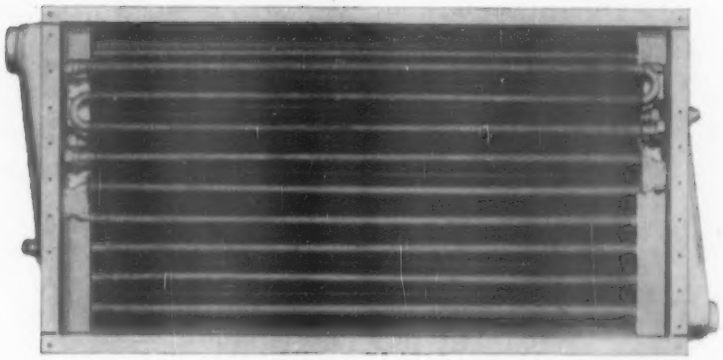
BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario

We Make

Extended-Surface

HEAT EXCHANGERS

Exclusively!



The pioneer in the field, Aerofin has concentrated on one thing, *and one thing only* — highly efficient, easily installed, easily maintained extended-surface heat exchangers. Aerofin's design, research, engineering and production experience and facilities are unequalled anywhere.

For High Efficiency, Easy Installation, Low Maintenance and Servicing Costs . . .

Aerofin is sold only by manufacturers of fan system apparatus. List on request.

AEROFIN CORPORATION

101 Greenway Ave.
Syracuse 1, N. Y.

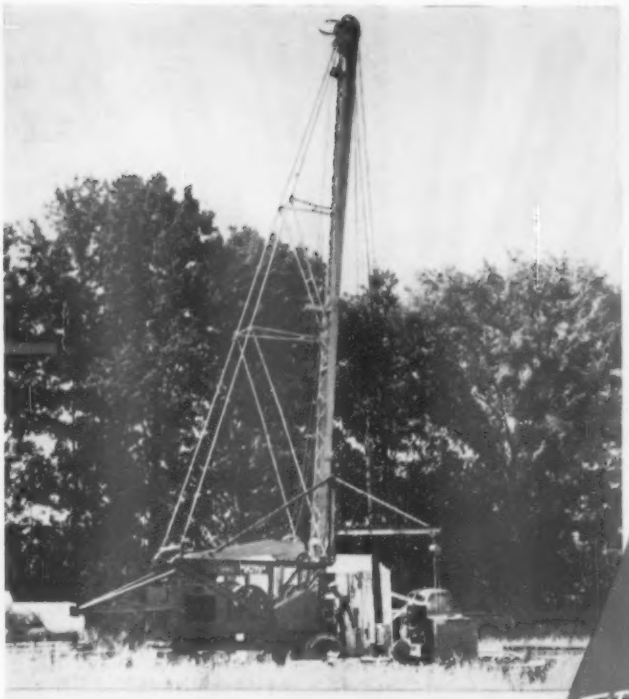
5 reasons why

there are more Bucyrus-Erie Spudders In Use Today Than Any Other Make

1	BIG CAPACITY	Each model has plenty of capacity for its range. The largest Bucyrus-Erie machines handle up to 6,000 pounds of tools, drill top-to-bottom to 6,000 feet.
2	VERSATILE	With a Bucyrus-Erie spudder you are ready for any job — top-to-bottom drilling, deepening, drilling-in, workover, tube-and-rod servicing, swabbing, clean-out, etc.
3	FAST MOVES— QUICK SETUPS	Lost time between jobs is at a minimum with Bucyrus-Erie spudders. They can be torn down, moved, set up, and put to work again in a few hours — not days.
4	HANDY OPERATION— ACCURATE CONTROL	Controls are conveniently arranged and grouped close to the hole. All operations are quickly and accurately controlled — you can stop drilling and start pulling tools in less than ten seconds.
5	STURDY CONSTRUCTION— LONG LIFE	Drilling machinery is held in rigid alignment by all-steel, electric welded fully-trussed box frames. Special-steel jackshafts, extra large clutches, and other features contribute to the ability of Bucyrus-Erie spudders to handle difficult jobs. 2554C

See your local Bucyrus-Erie spudder distributor or write direct for complete information on these and other features of Bucyrus-Erie 60-L, 28-L, 36-L and 48-L spudders. Learn how these fast, versatile machines can speed up your drilling and get more done.

BUCYRUS-ERIE COMPANY · South Milwaukee, Wisconsin



60-L drills top-to-bottom to 1,500 ft., servicing to 2,000 ft. Swings up to 2,400 lbs. of tools. Handles static casing loads up to 40,000 lbs. with casing tackle strut.

28-L drills top-to-bottom to 2,500 ft., servicing to 3,000 ft. Swings up to 3,000 lbs. of tools. Handles static casing loads up to 75,000 lbs. with auxiliary A-frame.

FIRST with the Finest in Spudders

36-L drills top-to-bottom to 3,500 ft., servicing to 4,000 ft. Swings up to 4,200 lbs. of tools. Handles static casing loads up to 120,000 lbs. with auxiliary A-frame.

48-L drills top-to-bottom to 6,000 ft., servicing to 7,000 ft. Swings up to 6,000 lbs. of tools. Handles static casing loads up to 160,000 lbs. with auxiliary A-frame. 300,000 lb. heavy-duty tripod derrick also available.

BUCYRUS ERIE

Pulled after 4½ years in a sour well

—corrosion negligible

These Monel valves served 4½ years in a sour crude well. When they were pulled, they showed practically no corrosion.

Here's the story of seven veteran Monel® gas-lift valves.

These valves, made by GARRETT OIL TOOLS, INC., gave excellent service for 4½ years in a well producing sour crude.

Careful examination showed the valves to be in excellent condition. Years of exposure to highly corrosive well fluids had produced only negligible signs of attack.

With service records like these, it's no wonder that Monel has become the standard material for all GOT gas lift valves.

GOT made their first pressure charged gas lift valve in 1946. Some of them have been in continuous service as long as 6½ years.

The reason for this long service lies in the combination of the right material and correct design. In addition to all-Monel construction, for example, the seamless bellows — the very heart of the valve — is given extra protection against excess pressures, distortion and contamination. It is supported on the inside by a valve stem guide ... and on the outside by a non-compressible liquid. This extra protection permits higher pre-charged dome pressures without damage to the bellows.

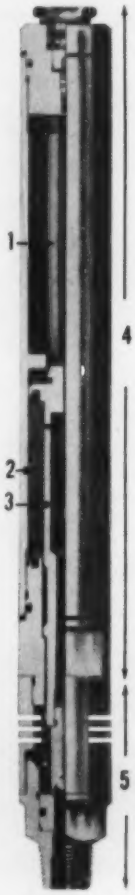
A pressure-charged dome replaces the pressure-charged bellows to hold the valve in closed position. The dome pressure can be changed in the field, permitting easy repair of valves as needed.

The fact that all types of GOT valves are interchangeable on one basic body reduces obsolescence and permits smaller inventories. Operators can thus easily convert their original valves to other types as well conditions change.

You can get detailed information on GOT valves by writing to Garrett Oil Tools, Inc., 2600 Nottingham St., Houston 5, Texas.

And remember, you can always call on Inco's Corrosion Engineering Section for help with your particular oil field corrosion problem.

It is advisable to place equipment orders with your supplier well in advance of scheduled use. Distributors of Inco Nickel Alloys can supply the latest information on availability from warehouse and mill.



1. Dome
2. Bellows
3. Valve Stem Guide
4. Type "O" Body
5. Type "O" Head Piece Assembly

Cutaway view of the Type "O" GOT Pressure Charged Gas Lift Valve. The body and the internal parts are made of corrosion-resisting Monel.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

Inco Nickel Alloys

Monel... *for minimum maintenance*

Over a THIRD *of Every* PREMIUM DOLLAR . . .

returned to POLICYHOLDER

What POLICYHOLDERS *Say*

This is one of many testimonial letters received from policyholders of the Texas Employers Insurance Association. These letters tell what policyholders think of the Service and Savings received from the Association.

Ask the Texas Employers representative nearest you to show you more of these letters, as proof of what Texas' largest writer of Workmen's Compensation Insurance can do for you.

40TH ANNIVERSARY 1914 1954

"We are in receipt of your check in the amount of $2,220.51 which represents the dividend savings on our Workmen's Compensation premiums.

"This is a very nice savings, as it represents, together with premium discounts, a total return of 36.5% of the premiums we paid to your company.

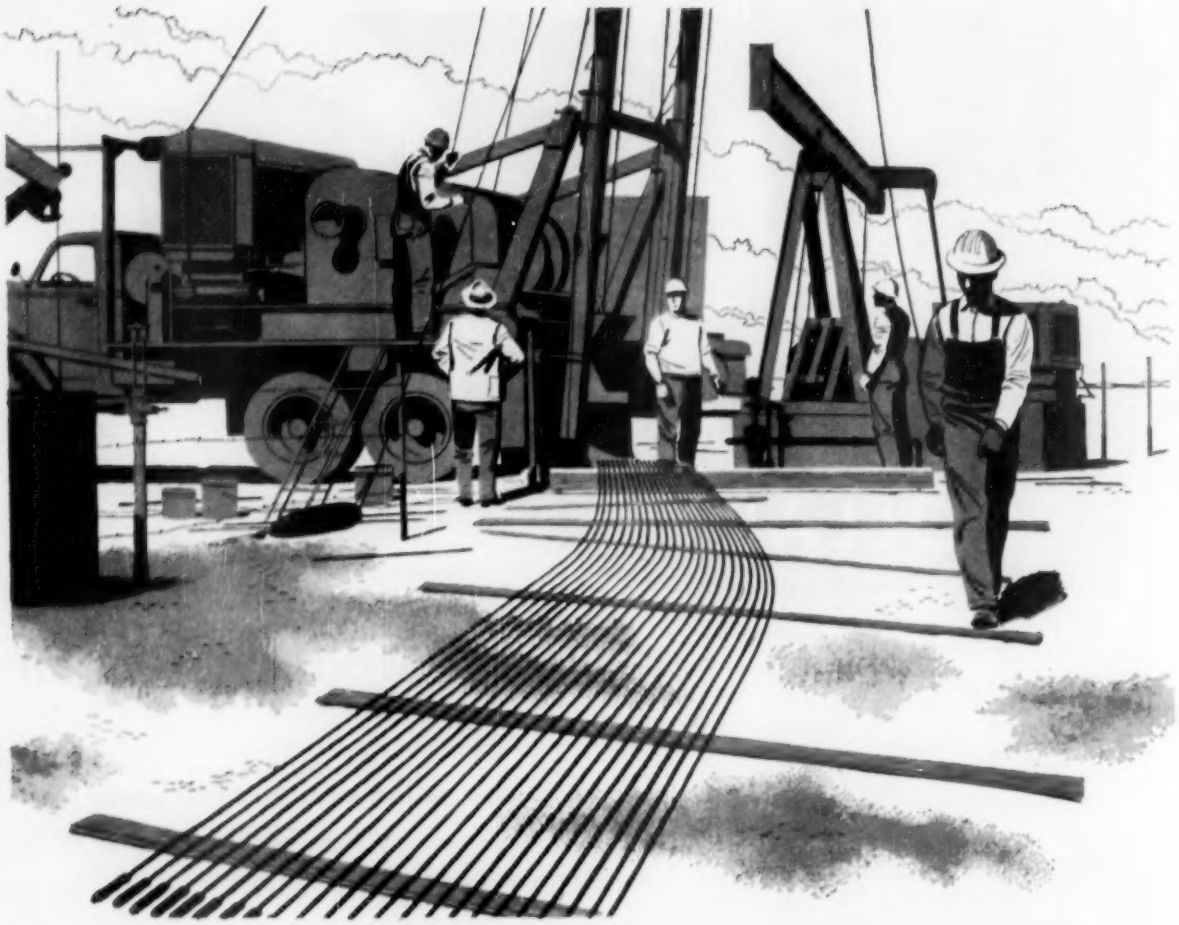
"Naturally we realize this would not have been possible without the fine cooperation we received from your claims and safety engineering departments. We are happy with the long and friendly association we have had with you, and we are glad for you to use this letter as our recommendation of your company in your sales solicitations."

Largest Writer of WORKMEN'S COMPENSATION INSURANCE *in Texas*

HOMER R. MITCHELL, *Chairman of the Board* A. F. ALLEN, *President*

Service Offices: ABILENE • AMARILLO • AUSTIN • BEAUMONT • CORPUS CHRISTI • DALLAS • EL PASO FORT WORTH • FREEPORT • GALVESTON • HARLINGEN • HOUSTON • LUBBOCK • MIDLAND ODESSA • PORT ARTHUR • SAN ANGELO • SAN ANTONIO • SHERMAN • TYLER • WACO • WICHITA FALLS

TEXAS EMPLOYERS INSURANCE ASSOCIATION
HOME OFFICE - DALLAS, TEXAS



problem well pump—surfaced 3 times in 4 months—now in use over 2 years with Kennametal* Balls and Seats

When one of the edge wells on lease in this Houston field went from the flowing stage to recovery by rod, corrosive and abrasive conditions required pump surfacing as often as three times in only four months of operation.

Two years ago, Kennametal Balls and Seats were installed in this pump in a double valving combination. Recently, the pump was surfaced to remove the packed sand. Both balls and seats were found to be in excellent condition and were replaced in the pump. They are now operating as well as when they were originally installed.

This is the quality of service that users report and that you can expect from Kennametal sintered tungsten and titanium carbide Balls and Seats. They last from three to five times longer than any of today's "special alloys."

If you have a problem well, tell your pump service man to standardize on Kennametal Balls and Seats which are installed by repair shops of most major pump manufacturers. They will cost you less in the long run. For further information, contact your local supplier.

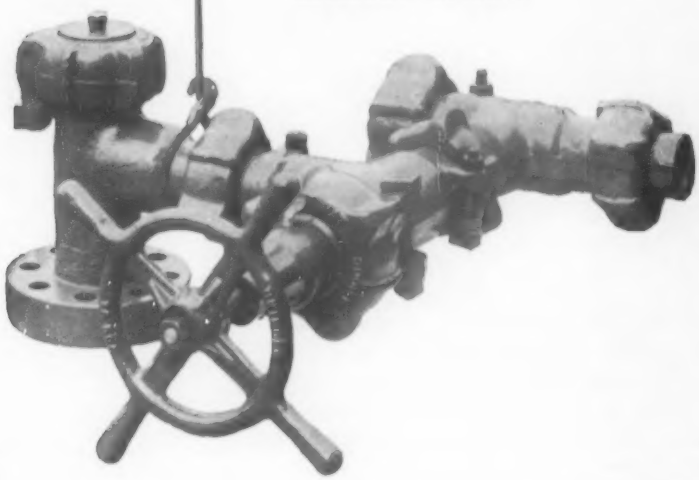
Kentanium* Balls provide excellent service in gassy wells, or where extreme conditions of corrosion and abrasion exist. Their light weight—⅓ lighter than steel—and extreme hardness minimize ball flutter, cage beating, fluid pounding and flour-sand cutting. Their high titanium carbide and nickel content assures excellent resistance to corrosion and electrolytic action. KENNAMETAL, INC., Latrobe, Pa.

*Registered trademark

INDUSTRY AND
KENNAMETAL
...Partners in Progress

UNIBOLT FLOW MANIFOLDS

started a new trend — the fabrication of salvageable parts into a compact, strong, lightweight unit that provides everything necessary above the master valve



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in stainless steel for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

Blanketed Base Pans and Automatic Sentries Push Service Dates Apart

Service dates skip months instead of days where operators have Minneapolis-Moline long-run oil field engines. MM exclusive water-jacket base pan with large built-in filters keep engine and lube oil at constant temperature under any load or weather condition.

Automatic control of crankcase temperature prevents sludging and enables more effective filtering. The high efficiency of MM exclusive vacuum crankcase ventilation is obtained by blanketing the base pan with engine water. This holds crankcase vapor above the dew point so that (instead of condensing and forming sludge) it is withdrawn.

Added advantages of MM long-run design are extra large permanently lubricated bearings, sealed pressure cooling with water by-pass and thermostat control, built-in oil-flow controllers and automatic sentries —safety cutouts that prevent damage in case of low oil pressure or excessive water temperature.

For complete facts and specifications on lowest cost and most dependable power in the oil fields phone

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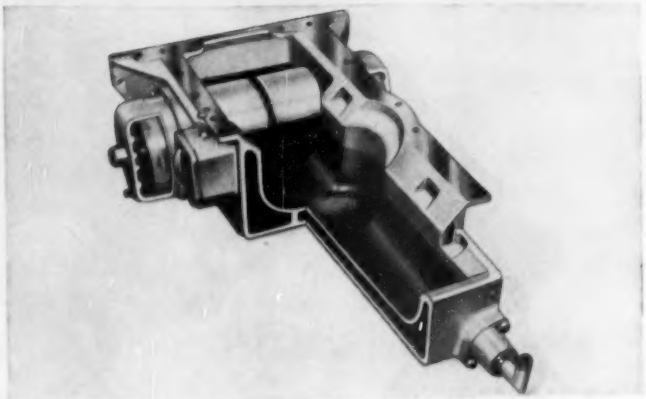
Twenty Years of Oil Field Engine Application at Your Service

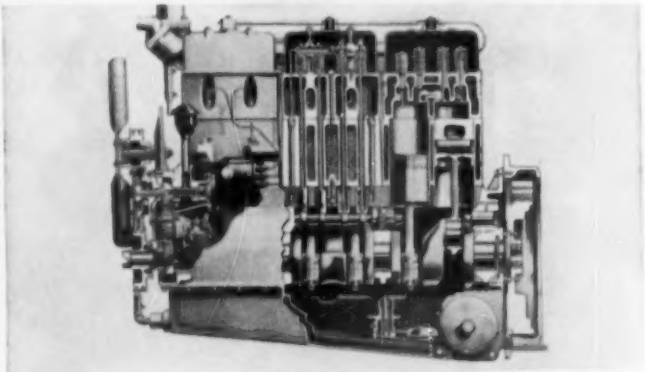
INDUSTRIAL DIVISION

MINNEAPOLIS-MOLINE

MINNEAPOLIS 1, MINNESOTA



Water-jacketed heat exchanger base pans with large built-in filters provide automatic thermostatic control of lube oil temperature. Oil flow controller maintains constant oil level from reservoir supply. Heavy flange on flywheel end provides 360° rigidity to crankshaft alignment.



Engine cross-section shows how MM cooling maintains the entire engine at a constant temperature. Variation maximum is 4° to 5°. Automatic thermostatic control and by-pass system act as heater or cooler—engine runs at constant temperature under all operating conditions.

NOW, IT'S REPUBLIC ELECTRIC FUSION WELD LINE PIPE IN GULF INTERSTATE PIPE LINE

3 Kinds of Line Pipe from Republic

Electric Fusion Weld Line Pipe in sizes 24″ through 30″ O.D.

•

Electric Resistance Weld Line Pipe in sizes 2⅜″ through 16″ O.D.

•

Continuous Butt Weld Line Pipe in nominal sizes ⅛″ through 4″.

Write for literature.

Wherever you go, you'll find Republic Line Pipe—Electric Fusion Weld, Electric Resistance Weld, or Continuous Butt Weld. This time, it's Republic Electric Fusion Weld Line Pipe, shown being installed in the section of Gulf Interstate Gas Company's 30-inch line through Tennessee and Kentucky.

Republic Line Pipe goes in fast—because it's *uniform.* Field joints line up quickly and accurately. Welding is fast and positive all around the circumference. High ductility assures smooth bends in the field or shop.

Republic Steel has been a leader in line pipe making for more than 25 years. More than 71,000 miles have been laid and are proving the dependability of this product in natural gas, crude oil and by-products lines of every type. Remember: you can get three kinds of line pipe from Republic to meet every piping need.

REPUBLIC STEEL CORPORATION
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Export Department:
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REPUBLIC STEEL

REPUBLIC LINE PIPE

ELECTRIC RESISTANCE WELD • ELECTRIC FUSION WELD
CONTINUOUS BUTT WELD

Other Republic Products include Casing and Tubing — Steel and Plastic Pipe — Studs, Bolts and Nuts — Heat Exchanger Tubes — Steel Buildings

3 grades of Aerocat® FLUID CRACKING CATALYST

for better fluidizing, circulating and attrition characteristics

in any fluid cracking unit

The importance of particle size distribution in catalyst efficiency is reflected in the names and performance of Cyanamid's three new grades of AEROCAT.

Following extensive research into existing fluid cracking unit needs, these grades were developed to cover the entire range of requirements. Now you can readily select the grade best suited to your unit operation and secure a higher degree of catalyst utilization through proper fluidization, circulation and reduced attrition. These grades represent a wide range, identified for your convenience by their Particle Distribution Index.

This is another advance in catalyst development that makes AEROCAT your most economical means to

- high octane yields
- high throughput
- low CO_2/CO ratio in flue gas
- high isobutane yield
- excellent heat, steam and sulfur stability

– all good reasons why 8 out of 10 users of synthetic catalyst specify AEROCAT Fluid Cracking Catalyst.

For details, write for a new technical data sheet "AEROCAT–Particle Size Distribution," or discuss your needs with our Technical Representative.

DESIGNED TO MEET ALL FLUID UNIT NEEDS

Aerocat 50/60 (Light) — for fluid units with low linear gas velocities, adequate dust disengaging space, excellent cyclone and Cottrell efficiency, low bed density needs.

Aerocat 60/70 (Intermediate) — for fluid units with moderate to high linear gas velocities, adequate catalyst recovery equipment.

Aerocat 75/85 (Narrow) — for fluid units with high linear gas velocities, moderate disengaging space, limited recovery equipment.

AMERICAN Cyanamid COMPANY

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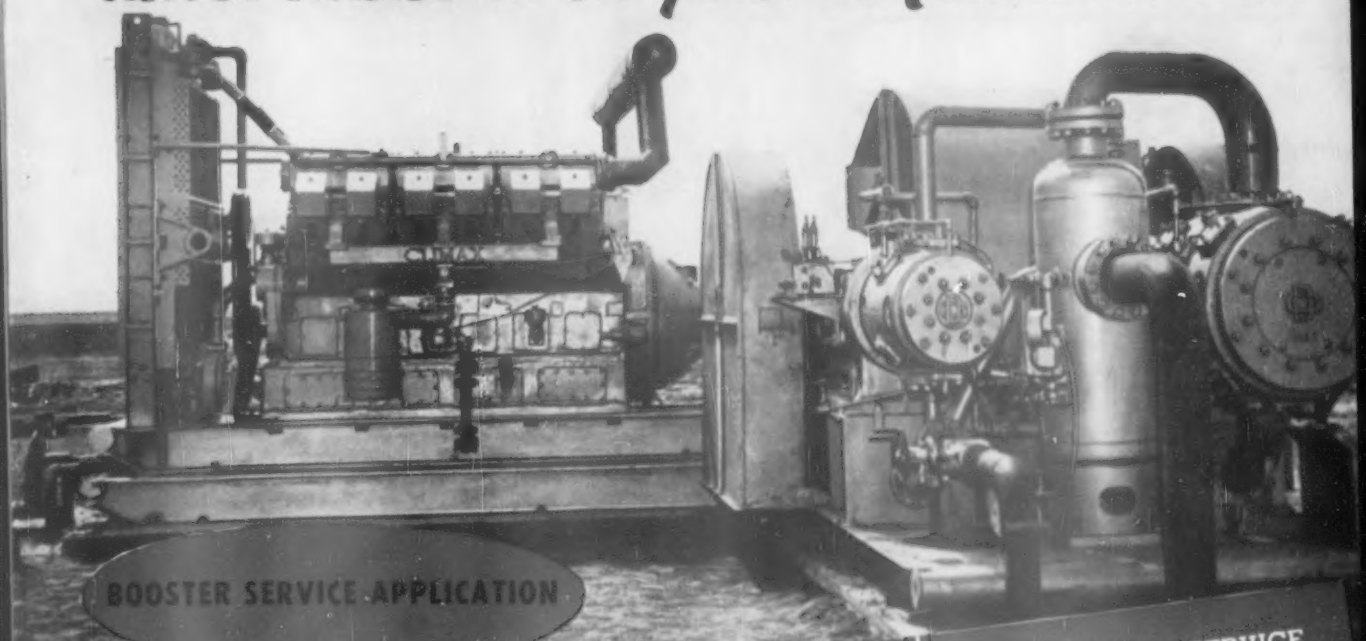
tailor made to fit your requirements...



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GARDNER-DENVER
Packaged COMPRESSORS

for BOOSTER SERVICE
GAS INJECTION
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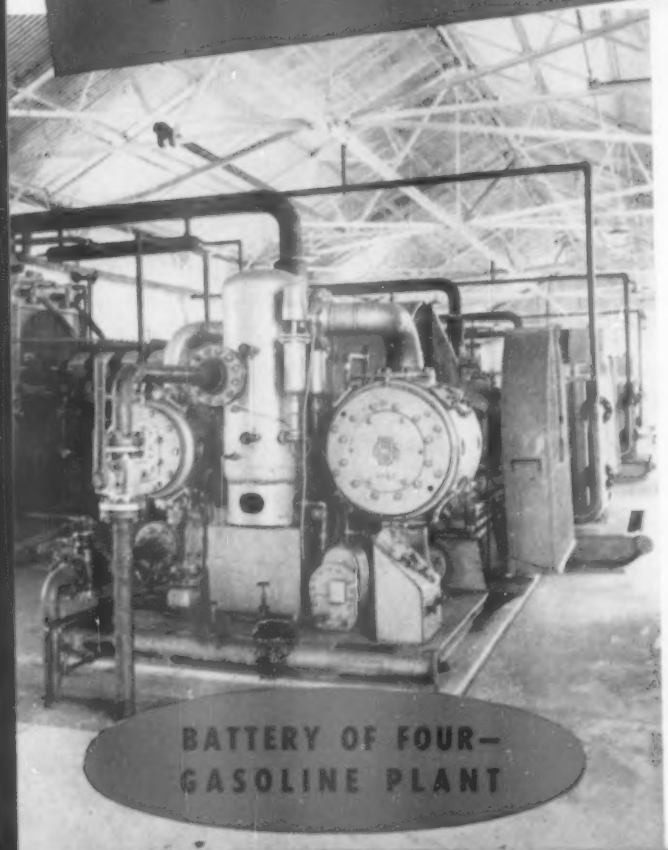
EFFICIENT • DEPENDABLE • ECONOMICAL



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GASOLINE PLANT

For booster service, re-pressuring or air-gas lift, Gardner-Denver Compressors come in a range of capacities and pressure ratings for all field conditions . . . designed specifically for your requirements.

Sizes from 5 to 275 h.p. . . . Portable or stationary models . . . Single stage or two-stage units . . . Vertical or horizontal compressors . . . Electric motor or gas engine drive . . . Complete, compact units — ready to hook up and operate.

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PUT IT OUT IN SECONDS

with a Kidde Portable extinguisher

Unless you get the jump on fire the minute it starts, you stand a good chance of kissing your business good-bye.

That's why it's so important to have a Kidde portable extinguisher near *every* fire hazard in your plant.

Protect motors, electrical equipment, flammable liquids and machinery with Kidde portables. Then, when fire strikes, you're ready for it.

Just grab a Kidde CO_2 or dry chemical portable, aim the horn, pull the trigger, and—Whoosh! No more fire!

Your *next* fire could be your *last* . . . Contact Kidde today!

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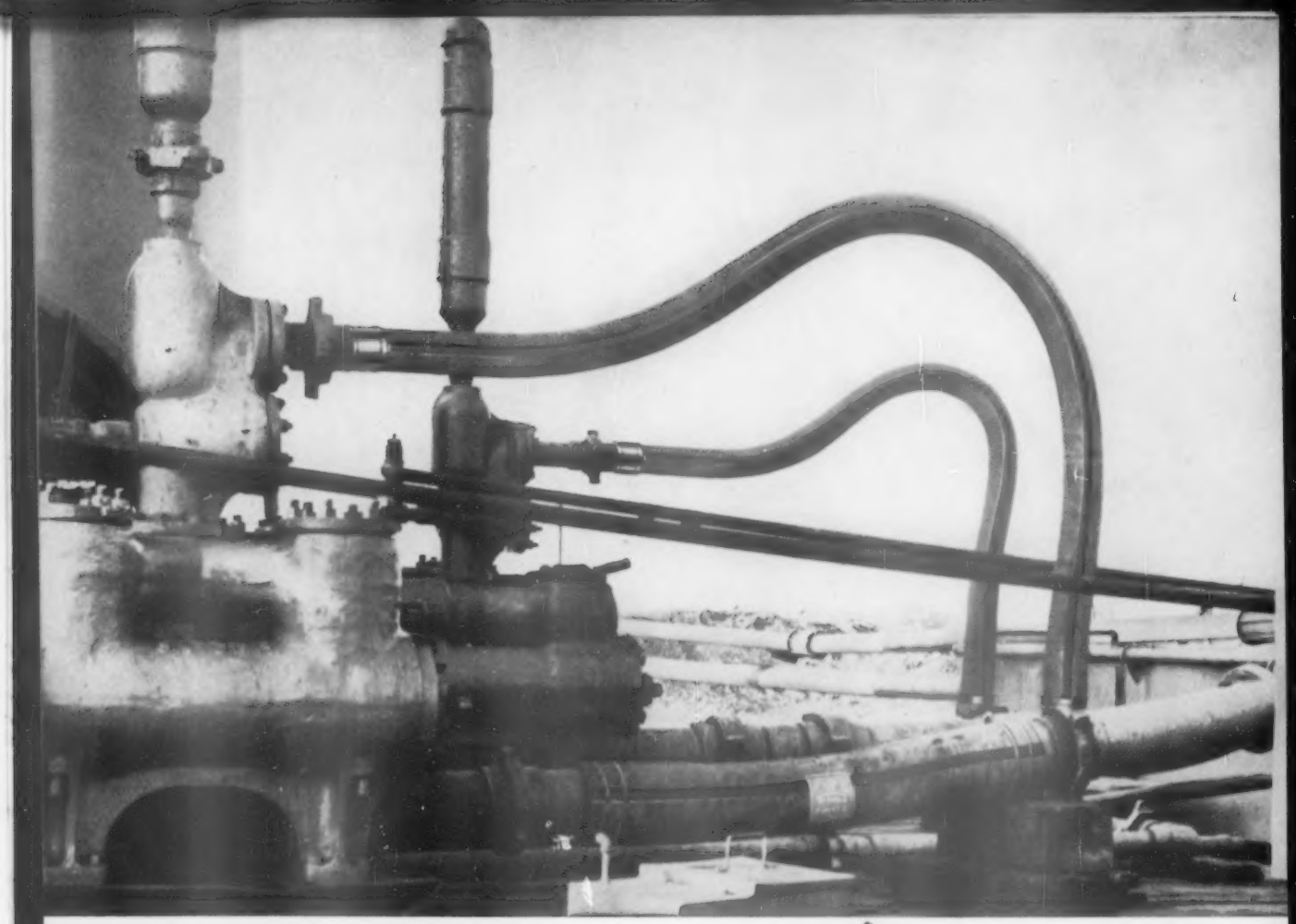


Thermoid Oil Field Products Are Built for Rugged, Continuous Service ...to Cut Your Drilling Costs

Thermoid Flexible Discharge Units provide rugged high pressure connections between mud pump and standpipe . . . eliminate sharp angle fittings, thus reducing turbulence and loss of pressure. Easily installed, they take up misalignment, save rig up and tear down time, resist vibration, cut time lost due to pipe breakage and loosened connections. Full flow pressure seal couplings are built in. Supplied in diameters of 2½", 3" and 3½" . . . standard lengths. Pre-tested to 5000 psi to assure blowout-proof performance.

Thermoid Mud-Flo Suction Hose absorbs pumping vibration and affords maximum flexibility. Thick inner tube and heavy galvanized wire reinforcement imbedded in rubber compound prevents collapse and provides unobstructed flow. Permits changing position of intake without changing connections. Cover withstands abrasion and weathering. Ends are sealed to help keep out moisture.

To keep your costs down, be sure you specify Thermoid Flexible Discharge Units and Mud-Flo Suction Hose.

Mid-Continent Offices and Warehouse, Houston, Texas
California Offices and Warehouse, Los Angeles

Flexible Discharge Unit

Mud-Flo Suction Hose

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

...ANOTHER TRIUMPH IN APPLIED PRACTICAL IMAGINEERING

...seeing the un-see-able

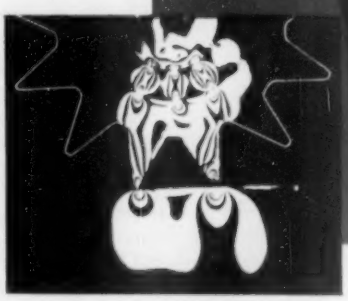
"It is as impossible to give the greater credit for petroleum's magnificent progress to either the oil operators or the fabricators of their equipment, as it is to say whether the hen or the egg came first."

The above quotation from a speech by the president of a major oil company is typical of the many statements of praise regularly being made by top men in the petroleum industry.

Astounding technological progress by the petroleum manufacture-supply-service industry is the reason for such widespread approval. Their more than 9000 research scientists and engineers are constantly surprising their great customer, the gigantic oil industry, with amazing new methods for inventing and improving equipment and services.

One of the most interesting of these new techniques enables an engineer to observe stress concentrations which simulate those set up by the drilling bit in a formation being drilled. Versatile and resourceful engineers, knowing the photoelastic properties of certain plastics, sought to use this knowledge to make stress concentrations visible in the formation at the point of drilling. Like the applying of most other general theories, this technique was not easy to work out in practice. But after innumerable trials in the preparing of the plastic model and the development of skill with such types of apparatus as the polariscope, polarizing filters, analyzers, and special cameras, it became possible to produce good pictures showing stress concentration in a manner that is of great diagnostic value.

The vision of P.E.S.A. members knows no horizons. More scientists, research engineers, development engineers, and field engineers are being added to the over-9000 already making noted accomplishments through aggressive adventurism. P.E.S.A. members are determined to be a teammate that carries its full load, along with oil company technologists, for advancing at an even greater rate the progress of one of the world's most dynamic industries — and, from the standpoint of strength and security of our nation, one of the most *important* — OIL.



A new technique, using photoelasticity, makes possible the study of stress concentrations which simulate what takes place in an actual drilling well.

Heretofore it was possible to study and analyze worn bits on the laboratory table — and such studies confirmed or disproved many a complicated mathematical projection on stress concentrations. But until the development of photoelasticity and techniques for applying it to practical problems, there was no way to study adequately the stress concentrations set up in the well formation itself by the action of the drilling bit. Now a plastic facsimile of the drilling well can be placed on the laboratory table. Here the stress concentrations similar to those which occur in well formations can be **seen** and studied.

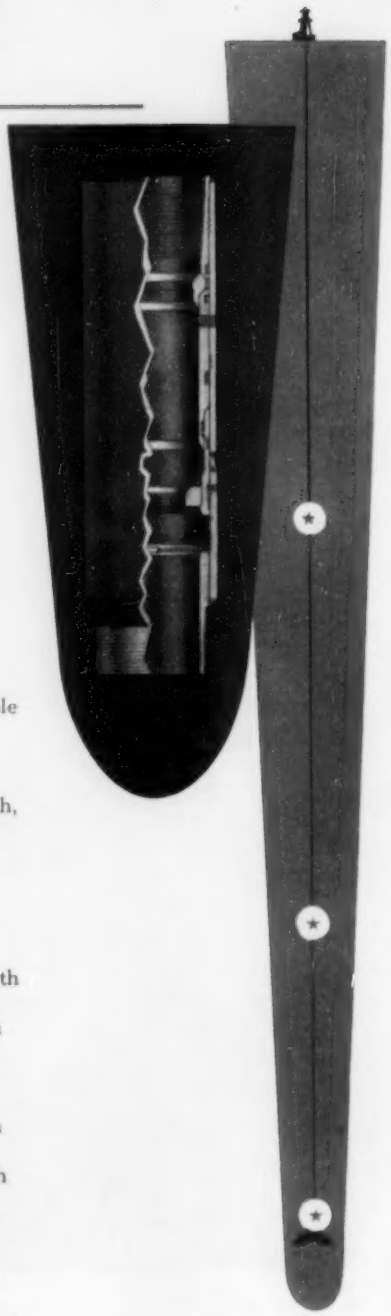
MANUFACTURE
SUPPLY
SERVICE

P.E.S.A.*

* Petroleum Equipment Suppliers Association

Composed of: manufacturers whose plants make the finest precision equipment . . . *supply stores* who add two other ingredients of value — where you want it — when you want it . . . *service companies* who make available to their customers the practical results of the theoretical research of some of the most brilliant scientific and technical men in the world.

CEMENTS *THREE* STAGES IN THE DEEPEST HOLES



HALLIBURTON'S *DV* MULTIPLE STAGE CEMENTER

Regardless of present depths, temperature or pressures, you can now have three stage cementing with all its time-casing-cement saving advantages. Halliburton's exclusive DV Multiple Stage Cementer—the only tool that can successfully cement three stages without leaving the hole—conquers the conditions that limit conventional tools to shallow wells with low formation pressures.

With the positive action of the Differential Valve, three stage cementing is no longer restricted by present well depth, temperature, amount of cement used, pump pressures, circulating time while landing casing or final well pressures, both inside and outside the casing. Even today's deepest holes can be successfully cemented with the accuracy needed to cut completion costs.

The DV Cementer has dual shut-off sleeves, actuated by the unique Differential Valve, that complete the work with cementing ports sealed and locked. This positive shut-off is able to withstand pressures above the collapsing strength of the casing while high pressure packing is arranged to give fluid-tight and gas-tight protection before the tool is open and after it is closed.

Only the DV Cementer can give this safer, positive action to two or three stage cementing in modern high pressure, high temperature wells. When you can save with full depth cementing, dual well completions, cementing widely separated formation or other multiple stage jobs, you can save *more* by using the Halliburton DV Multiple Stage Cementer—the universal three stage cementing tool. Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

They Say—

"Grave Robber"

Cartoon by Bill McClanahan in the Dallas Morning News.

Keep Alert and Thinking

". . . One of the things that has always seemed very significant to me about the industry I work in is that its raw material is not grown or made by man—it has to be found by him.

"And the finding is not easy. It calls for the exacting use of many scientific methods and devices, careful planning, great perseverance, and hard physical work. On top of that there needs to be a liberal amount of native luck. Such a combination of requirements is calculated to bring out the best in companies and individuals engaged in the work. For unless they keep themselves constantly alert and thinking, they are soon lost in the passing traffic of those who do. . ."

David A. Shepard, director of Standard Oil Co. (N.J.), in an address before the Denver Chamber of Commerce.

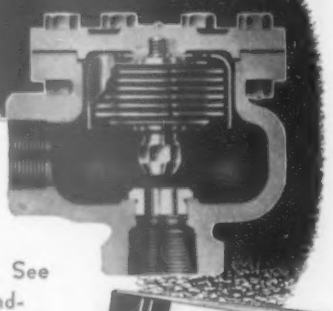
"The Oil Crowd"

"The Texas oil crowd is taking no chances on an unfriendly Congress. The oil millionaires were able to get the tidelands oil bill through the Congress and signed by the President, and it would appear that their interest in influencing congressional elections in other states would have diminished. But they still have a big stake.

"They must now guard against legislation in Congress that would lower the 27½ per cent 'depletion allowance' under which they are given tax ex-

NICHOLSON TRAPS

for every plant application



Send for Nicholson catalog 953. This 32-page standard reference on advance-type trapping of steam, air and other mediums contains: installation diagrams, charts for determining trap sizes, and advice on specific problems. See why leading plants are increasingly standardizing on Nicholson traps for increased production and minimum maintenance: thermostatic (illustrated) and metal expansion for pressures to 250 lbs.; weight and piston-operated, to 1500 lbs.

Send for Helpful Booklet

W. H. NICHOLSON & CO.

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FOR ECONOMY UNEQUALLED — FOR SAFETY UNSURPASSED

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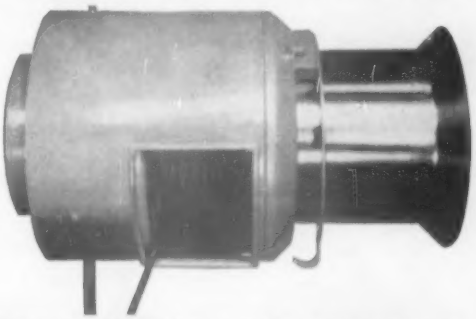
Safety



BREAKOUT AND SPINNING LINE CATHEADS

KelCo Safety Breakout Catheads are available in two sizes—Model 12 for light drilling rigs and servicing hoists—Model 16 for medium and heavy drilling rigs—choice of mechanical, hydraulic or air controls on either model. Tong line and patented tong block furnished at no extra charge.

AVAILABLE THROUGH YOUR FAVORITE SUPPLY STORE

Representatives in All Fields

Be Safety Wise—KelCo-Ize

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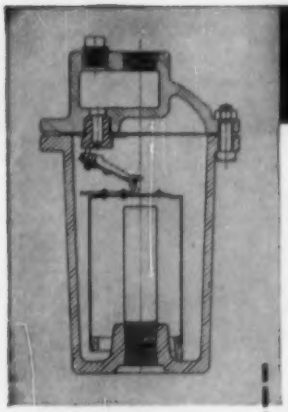
SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS • TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS

LIQUID LEVEL CONTROL OF CORROSIVE LIQUIDS?



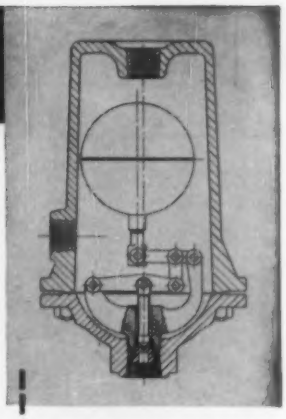
INVERTED BUCKET TRAPS with light weight buckets for draining light liquids from gases. The same design and operation proved on thousands of steam trap applications.

. . . These ARMSTRONG TRAPS are the Maintenance-Saving Answer

ARMSTRONG traps extensively have been used to drain corrosive liquids from receivers and maintain the liquid level at any desired point. Bodies and caps have been furnished of nickel, aluminum-bronze, monel, stainless steel and other metals which can be cast or forged. Working parts, also, have been of nickel, monel, stainless steel or any weldable material available in sheet, rod and bar form.

Traps made of low carbon chrome iron, for example are being used to drain 60% Nitric acid from receivers at 75-100 psig. Perhaps you have a corrosive liquid control problem that can be solved with Armstrong traps. For complete data write:

ARMSTRONG MACHINE WORKS
868 Maple Street • Three Rivers, Michigan

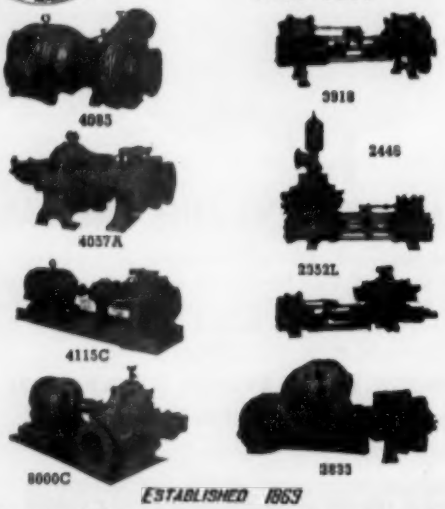


BALL FLOAT TRAPS with compound or direct lever mechanism for draining water or light liquids from gases or other liquids. Also widely used for air or gas relief service.

ARMSTRONG STEAM TRAPS • AIR TRAPS • GAS TRAPS
AIR RELIEF TRAPS • LIQUID LEVEL TRAPS

PUMPS

CENTRIFUGAL
RECIPROCATING
BUILDERS OF OUTSTANDING PUMPS
Since 1869



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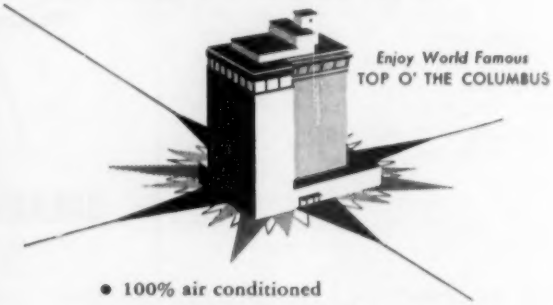
THE COLUMBUS
Miami's Finest Hotel



Enjoy World Famous
TOP O' THE COLUMBUS

- 100% air conditioned
- Convenient to everything in downtown Miami
- Ticket office hub of all airlines serving Miami

17 floors up . . . fine cocktails and dinners . . . enjoy Miami's most spectacular view of Biscayne Bay through walls of glass.

THE Columbus HOTEL
Biscayne Boulevard at First Street, Miami, Florida C-6

emption on millions and millions of dollars of income. If they were to have this exemption reduced, many of the millions they make from the tidelands reserves will go back to the Government in the form of taxes. This would mean they would have a lot less money to use to influence the election processes in the various states."

Editorial in the Madison, Wis., Capital Times.

Petroleum and War

"The continuing importance of petroleum for military purposes is indicated by the fact that during World War II, two-thirds of all shipments were petroleum and petroleum products.

"If oil is so important, then it is necessary to have sound conservation and regulation policies if the United States is to retain an oil reserve producing capacity essential to national security and protection of the consumer. . ."

W. J. Murray, member of the Texas Railroad Commission, in an address before the Tulsa Chamber of Commerce.

Comparing Prices

"Excluding taxes, gasoline prices in America have risen only 8 per cent since 1925. Even if you include the taxes . . . the total price has risen only 31.9 per cent.

"Compare this 8 per cent increase then with today's prices of other necessities. The average price of all consumer goods has risen 53.5 per cent . . . clothing prices have gone up 62.8 per cent . . . food costs have increased 72.9 per cent . . . household furnishings 65.8 per cent.

"It is competition in all phases of the oil industry which largely has been responsible for this remarkable record. . ."

T. S. Petersen, president of Standard Oil Co. of California, in an address before the Spokane Chamber of Commerce.

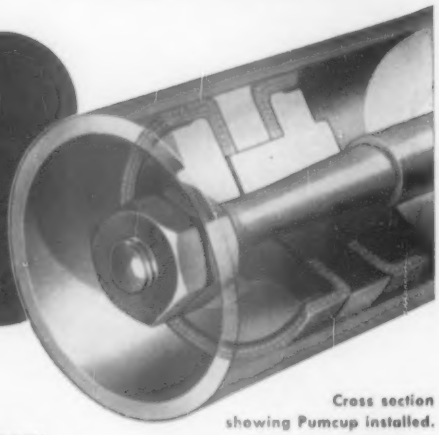
Supply Catching Demand

". . . Until very recently the oil industry has been hard pressed to increase supply as rapidly as demand has increased; at least this has been so from, say, the late 30's. World War II started in 1939 and continued for 6 years. During most of that period, there was no opportunity for the industry to do any more expanding than what was permitted by the government. . .

"With the ending of the war . . . we found ourselves hard put to it to meet the surprisingly large civilian demand,

PRESSURE UP! COSTS DOWN!

Slippage Reduced
in PUMPS
AIR CYLINDERS and
HYDRAULIC CYLINDERS
with
DARCOVA PUMCUPS



Cross section showing Pumcup installed.

NORMAL wear of ordinary packing reduces efficiency to a tremendous degree.

In contrast, Darcova Pumcups actually retain their efficiency . . . and they outlast most other packings at least 3 to 1!

Their scientific construction makes it possible to reach *and hold* peak efficiency. Under pressure Pumcups hug the cylinder walls to provide a uniform seal and exert full pressure where it is needed. This means reduced slippage, lower power costs and far less maintenance.

Write for helpful data-and-proof bulletins: No. 4502 on Pumcups for air and hydraulic mechanisms; No. 4401 on Pumcups for reciprocating pumps.

Cost-minded engineers in many industries have standardized on Pumcups to solve their packing problems. The list of successful applications includes the following installations:

- Die casting machines
- Forming and drawing presses
- Straightening presses
- Pipe bending machines
- Briquetting machines
- Pusher mechanisms
- Door control devices
- Lifting and dumping devices
- Spraying equipment
- Proportioning pump regulators
- Recoil cylinders
- Air booster pumps
- Grease guns
- Automatic bottling and filling machines
- Extrusion presses
- Steering mechanisms

DARCOVA
THE ORIGINAL COMPOSITION CUP

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 1, PA.

PUMCUPS

Always the same high standard of quality

• It's wise to standardize with these WECO Compounds for tool joints and drill collars. Every gallon of these WECO Compounds has the same unvarying high quality—the same dependable assurance of proper thread lubrication and protection for string after string of drill pipe and drill collars.

Immediate availability, today and tomorrow, is another important reason why it's wise to standardize with WECO Compounds. Wherever you are—whenever you need them, you can always count on getting WECO NO-GALL and LO-TORK to protect tool joint and drill collar threads.

PESA

It's wise to standardize with... WECO

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and just about the time we were squared away to deal with that satisfactorily, the Korean fighting broke out and lasted into 1952.

"It is therefore only in the last couple of years that crude producibility has really caught up with and gotten substantially ahead of current demand. . ."

B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc., in an address before the Oil Men's Club of Kansas City.

Coal Industry Charges

"The coal industry has suffered in its competitive efforts as a direct result of policies adopted by the federal Government which have tended to raise the delivered price of coal above levels which would have prevailed in the absence of action by the federal Government.

"On the other hand, the natural-gas industry has grown as a direct result of a benevolent federal policy aimed at promoting widespread use of natural gas."

From a petition filed by the National Coal Association with the Interdepartmental Committee on the Soft Coal Industry.

Support Pledged

"It is obvious that congressional action will be required to solve the worrisome problems raised by the Supreme Court decision (in the Phillips case). It will be my purpose to shape that action in such a way as to halt the march toward unnecessary and confusing government regulation."

Texas Sen. Lyndon B. Johnson at the Texas Mid-Continent Oil and Gas Association meeting.

No Handout Needed

". . . Long Beach occupies a unique position in the petroleum industry. The city maintains a direct interest in the management of its valuable petroleum resources within its own harbor area. . .

"The Long Beach story is a forthright demonstration of community cooperation. It stands in striking contrast to other areas which have been willing to surrender management of their own resources for a promise of a federal handout or subsidy. . ."

Secretary of Interior Douglas McKay in an address before the Long Beach Chamber of Commerce.

Forecast for '54

"There has been an over production in recent months, particularly of gasoline, and product prices have weakened materially. However, adjustment in refinery runs and adjustments in the

yields of the various products at the refineries should correct this.

"The upturn in general business which we expect during the latter half of this year, plus the expectation of normally cold winter weather as compared with the abnormally warm winters we have had for a number of years, should lead to a progressive improvement in industry operations from current levels.

"For the year . . . we expect oil consumption to be at least 2 per cent higher than last year."

M. J. Rathbone, president of Standard Oil Co. (N.J.), during the National Association of Manufacturers "It's Your Business" radio series.

Leave It Alone

". . . Any congressional tampering with this provision (the depletion allowance) of our tax law may well jeopardize the destiny of our country. . .

"If we do not provide for the constant replenishment of our resources (the equivalent of the 10,000,000 bbl. of oil that we use each day), our standard of living must certainly fall, and with it our security. . ."

George R. Bryant, vice president of The Texas Co., in an address before the Pampa, Tex., Rotary Club.

CALENDAR OF EVENTS

NOVEMBER

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.

4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

4-5 Third Annual Instrumentation Conference, School of Engineering, Louisiana Tech, Ruston, La.

4-6 Air Pollution Control Association conference, Biltmore Hotel, Los Angeles.

5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.

8-9 Gas Measurement Institute, Legion Hall, Liberal, Kans.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.

17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.

18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.

18-19 Ninth Midwest Quality Control Conference, Society for Quality Control, Dallas.

18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.

28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission winter meeting, Drake Hotel, Chicago

2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.

3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.

12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

1955

JANUARY

17-18 Kansas Oil Men's Association, annual convention, Baker Hotel, Hutchinson, Kans.

26-28 Symposium on instrumentation for process industries, A. & M. College of Texas, College Station, Tex.

27-28 American Chemical Society, symposium on hydrocarbon chemistry, Rice Hotel, Houston.

FEBRUARY

13-17 American Institute of Mining and Metallurgical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

13-18 A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston.

This isn't exactly the problem we're referring to, but the need for an **automatic** shut-off valve can be just as drastic.

The Enardo tank shut-off valve is completely **automatic.** You can therefore eliminate those second trips to close the tank valves. When the pipeline valve is turned on, the Enardo shut-off valve locks in the open position. When the oil reaches a predetermined shut-off level in the tank, the valve will close **automatically.** Check valves are available in ALL models, saving installation of extra checks.

Stop wasting time and gasoline. Write Enardo today for further information about the Enardo **automatic** tank shut-off and check valve models.

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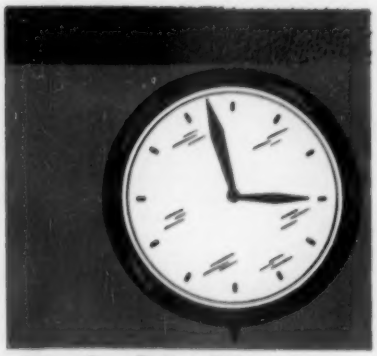

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Complete it as directed and send it to us. We'll see that you get more information.

In that way, you'll get the fullest value from your

JOURNAL READING TIME

14-16	Rocky Mountain section of A.A.P.G., annual regional convention, Billings, Mont.
16-18	National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.
25	National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

4	Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.
7-11	National Association of Corrosion Engineers, Palmer House, Chicago.
9-11	American Petroleum Institute, Division of Production, Southwestern spring meeting, Jung Hotel, New Orleans.
24-25	American Gas Association, gas supply, transmission, and storage conference, Wm. Penn Hotel, Pittsburgh.
27-29	Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.

APRIL

13-15	Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.
13-15	American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.
19-21	Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.

MAY

1-4	Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.
1-4	American Institute of Chemical Engineers, Shamrock Hotel, Houston.
9-10	American Gas Association, gas supply, transmission, and storage conference, Hotel William Penn, Pittsburgh.
9-12	American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.
14-22	World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt Germany.
16-18	American Petroleum Institute, Division of Transportation, products pipeline conference, Edgewater Beach Hotel, Chicago.
16-18	Southern Gas Association, New Orleans, La.
23-25	American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

JUNE

5-9	Canadian Gas Association, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.
6-10	American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.
6-15	Fourth World Petroleum Congress, Rome, Italy.
9-10	Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.
9-10	Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.
16-18	Interstate Oil Compact Commission, Denver.
JUNE 28-JULY 1—	American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

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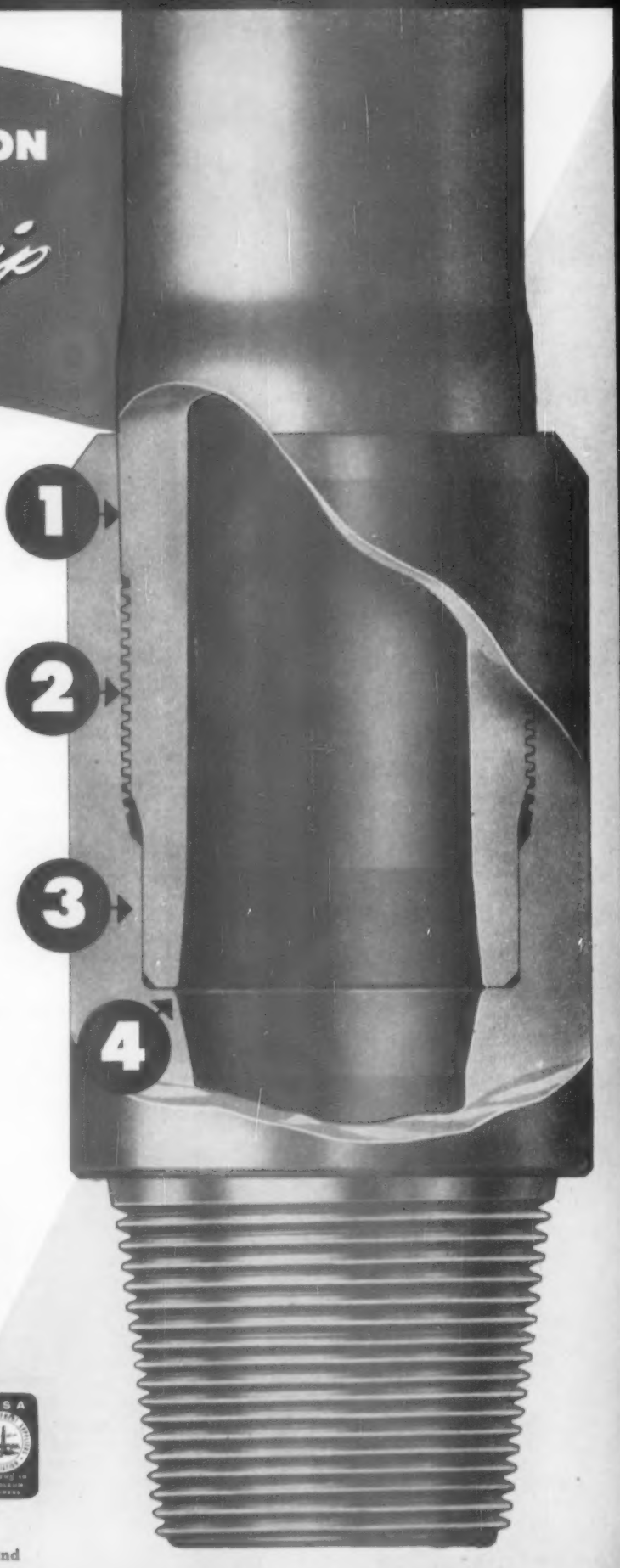

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for positive protection against joint leakage and creep!

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for a tighter seal as pump pressures and tension loads increase!

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for replacement ease because worn joints can be removed and replaced with new, right at your rig!

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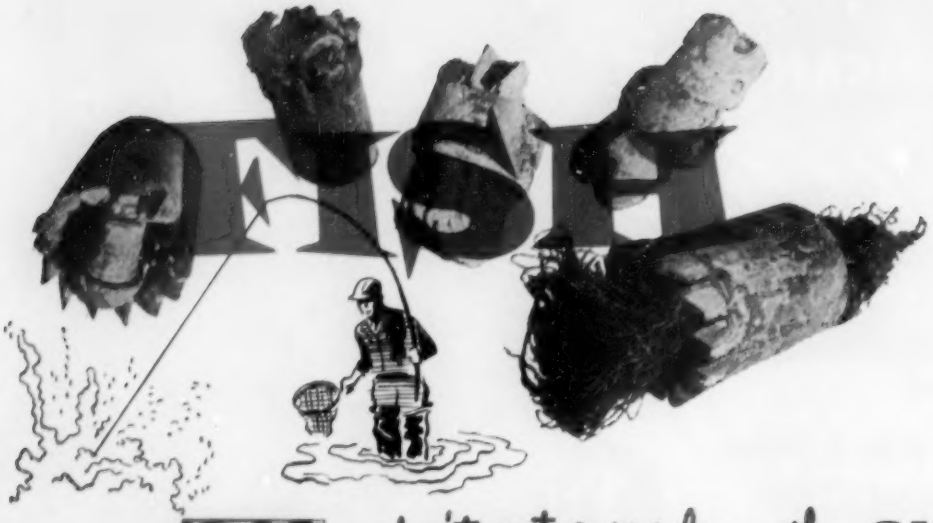
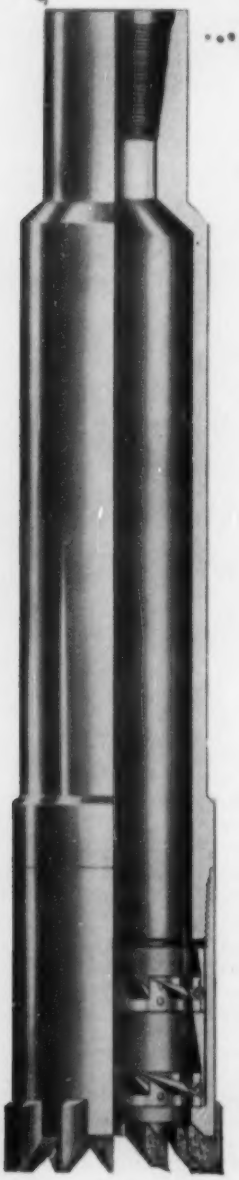


...don't get away from the GLOBE



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Globe Junk Catchers are familiar friends to the oil industry, everywhere. They have performed fast and profitably, making complete recoveries of everything from snarled wire rope and small broken pieces of junk to complete pilot bits.

The Globe is an emergency tool that never fails! . . . available with either dog type or magnet type catchers.

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Y Equals DCE

OKLAHOMA wildcatters now have a new hazard added to all their other woes—higher mathematics. In the good old days, when a man brought in a new oil well he had it made. Now he has to use an electronic calculator, or at least call on a Ph.D. to consult his slide rules and logarithm tables, to learn how much oil he can produce, if any.

The Oklahoma Corporation Commission has adopted a new formula for determining the discovery allowable of a new well. It's very simple—just Y equals DC times E raised to the mx power. All you have to know is a few little things such as that E is the base of Naperian logs (for your information those are mathematical logarithms, not well logs), m is the depth-cost-ratio exponent carried to the fifth decimal, and C is the base-market-demand constant of 15.036.

It's often said that science came late to the oil industry, but when it came it came in a big way. Well, science has come to discovery allowables with a vengeance. The poor old one-gallus well digger has to take a back seat to those bright young college boys with Petroleum Engineering degrees.

This new formula is said to be very scientific and completely fair. Probably it's progress, even though puzzling. But it's worth it if it will bring Oklahoma's actual production into the same ball park with the estimates of what the allowables should yield.

Hyphenproof Haven

AN article on nonexplosionproof motors in the October 18 issue of our favorite oil publication offers another opportunity to comment on hyphens, a subject which seems to amuse readers as much as it worries editors.

This comment has nothing to do with the article nor the motor, but simply the one-word form. Contributing authors frequently are puzzled, and occasionally infuriated, at the way we edit their copy to put in or take out hyphens, capital letters, or abbreviations. It's just our style, that's all.

As we mentioned some time back when explaining all the rhubarb in our shop over changing "pipe line" to "pipeline," every self-respecting publishing house has its own manual of typographic style which governs such things as compound words and the use of hyphens. Only trouble is that no two of them agree in all respects and often they disagree with the dictionary. And in case of doubt, our own stylebook always takes precedence.

So there was no doubt about "nonexplosionproof." Our stylebook plainly says that prefixes are made solid with their stems (except for a few stated exceptions) and that most suffixes (including specifically "proof") are also used hyphenless. It makes no difference that the latest edition of Webster's unabridged prefers the hyphenated form: explosion-proof. What's the use of having your own stylebook if you don't follow it?

This particular motor, not being proof against explosions, was used in a hazardous area but was so protected that it was made safer than in its prenonexplosionproof condition. This gave it at least a seminonexplosion-proofability, or, if the protection was absolute and complete, made it an ultranonexplosionproof motor. This reminds us of that classic that's often called the longest word in the English language: antidisestablishmentarianism.

All this business of watching out for hyphens makes editors and proofreaders feel like the fellow who wrote the following poem—which we stole bodily from another publication but conscientiously dehyphenated to conform to our stylebook:

I want an odorproof, motorproof car,
And a shockproof, hockproof watch,
And a frayproof, fadeproof star,
And some waterproof, lottaproof Scotch.
I want a dunproof, runproof spouse,
And a debtproof place to dwell—
Not this shatterproof, rustproof, soundproof, dustproof, foolproof padded cell.

Henry D. Ralph.

LET'S TAKE A LOOK INSIDE OF A

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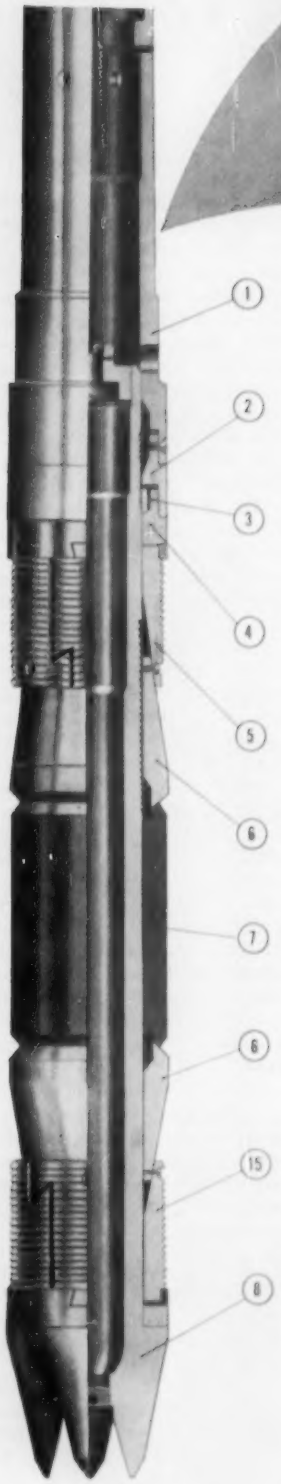
TECHNICAL OIL FIELD SERVICES

DRILLABLE WIRELINE BRIDGING PLUG



and see how and why it gives such positive packoff against pressures either up or down

1. Ram Adapter, to transmit downward pressure of setting tool. It may be removed after the plug is set.
2. Lock Ring Adapter forms a housing to enclose the lock ring and prevent its movement after engagement with the body.
3. Lock Ring, triple-wickered, engages wickers on the body to prevent any unsetting action after packoff. Both lock ring and seat are tapered so that, the greater the external pressures, the tighter the locking action.
4. Slip Locking Ring acts as a guide for the slips, which are dovetailed into it, insuring even movement and equal pressure against the casing on all sides.
5. Upper Slips support the body against pressures from below and prevent upward movement of the set plug.
6. Cone. The two cones force the slips against the casing and expand the packing sleeve for leak-proof packoff.
7. Packing Sleeve of oil-and-gas-resistant synthetic rubber is double-lipped, with a wire in each lip, to insure positive packoff and fast running without premature expansion. The greater the differential pressures, the tighter the seal.

15. Lower Slips, keyed to the body, prevent downward movement of the set plug from upper hole pressures.

8. Body. The foundation of the plug. In drilling out, the body drops to bottom after the lock ring grip is broken. The bull plug fins, tapered to guide the plug into liners or other restricted passages, prevent rotation under the bit when the entire plug is to be drilled up.

If you don't have your copy of the new, revised Lane-Wells Bridging Plug Bulletin, write for it now. It gives full details on construction, applications and drillout procedures.

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Imports have passed the level of producers' tolerance

A SHOWDOWN is coming soon on this matter of imports of foreign oil. No matter how they are analyzed or explained, imports are too high for domestic producers to take without a fight.

This was evident in the temper and the statistics displayed at last week's meeting of the Independent Petroleum Association of America. Partisan this outfit may be, but its statistics are pretty sound and its forecast is the best available at present.

Here's the estimate of the current year compared with 1953: Total demand up 1.0 per cent; domestic production down 0.9 per cent; imports up 1.5 per cent.

The 1955 forecast: Total demand up 3.1 per cent; domestic production up 2.3 per cent; imports up 7 per cent.

AND THAT'S NOT THE WHOLE PICTURE. The most significant factor is domestic capacity to produce. If this were slipping, imports would be welcome, and no problem.

In recent years the domestic industry has increased its capacity to produce crude oil by 300,000 to 400,000 bbl. daily each year. This is more than the average annual increase in total demand in this country during the same period.

Several years ago we had a reserve capacity to produce 1,000,000 bbl. per day beyond the then current rates—a desirable safety factor though expensive for the industry to carry. Today that reserve capacity is in the neighborhood of 1,700,000 bbl. per day—so high that producers say it hampers future expansion.

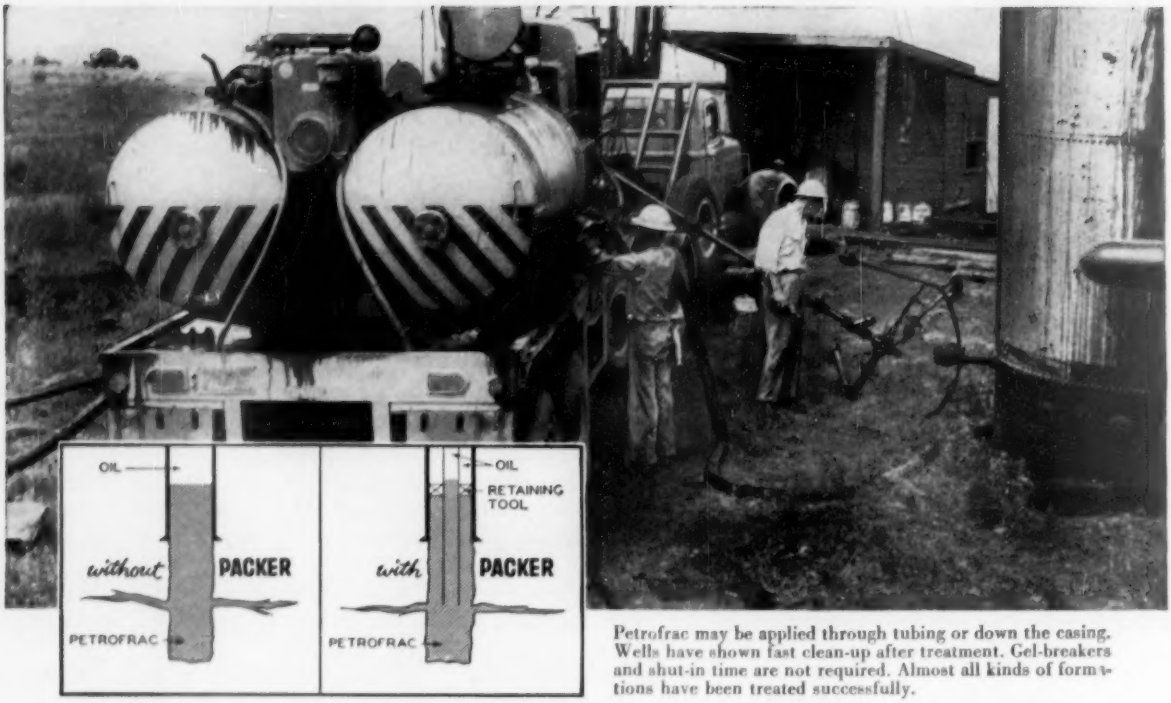
Imports were 12.8 per cent of new supply in 1953, will be 13.1 per cent in 1954, 13.6 per cent in 1955—a slow rate of increase but a lot of barrels, a trend in conflict with availability of domestic supply.

Domestic producers, by and large, have not suffered seriously yet as measured by statistical yardsticks of activity. But they foresee a creeping paralysis if imports' share of the market keeps rising in the face of excess producing capacity here.

GLOBAL THINKERS MAY TALK about foreign-trade balances and the need of other countries to export. Statisticians may compute the percentages a little differently. Economists may discuss such corollary factors as the growth of natural gas and natural-gas liquids, changes in inventories, the special place of residual fuel, or the geographical impact of imports.

But any way it's figured, imports are so high as to convince producers that the health of the domestic industry is endangered.

Domestic producers aren't going to stand for it much longer. They feel they've been patient long enough. They are getting set for a showdown—a hard drive for restrictive legislation by the next Congress.



Petrofrac may be applied through tubing or down the casing. Wells have shown fast clean-up after treatment. Gel-breakers and shut-in time are not required. Almost all kinds of formations have been treated successfully.

PETROFRAC—NEW FRACTURING SERVICE

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DOWELL fracturing method makes use of operator's lease crude oil . . . can be tailor-made to suit well conditions

Here's a new Dowell fracturing service designed to increase production from oil and gas wells. It's Petrofrac* —a treatment that uses graded sand and your own lease crude oil. The oil is thickened with a special chemical agent to give it enough body to suspend and carry the sand into the formation.

For proof of its effectiveness, look at this actual case history: An old well was plugged back and perforated opposite a sandstone formation. The well swabbed 24 BOPD. Then Petrofrac jumped production to 720 BOPD, flowing. After a period of flush production, this well leveled off at 300 BOPD, pumping and flowing.

Kerosene, diesel fuel or distillate may be used when lease crude is not available or suitable. As in other Dowell fracturing services, sand may be pumped into the formation in batches—a fine-grained sand followed by a coarse-grained sand.** This is designed to give larger fractures and better fluid drainage.

For more information on Petrofrac or other Dowell services—such as acidizing, perforating, Electric Pilot—call your nearest Dowell station today! Or write directly to Dept. K-11, DOWELL INCORPORATED, TULSA 1, OKLAHOMA.

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THIS WEEK... ...IN THE NEWS

ONE OF THE MOST UNUSUAL dedications in the oil industry took place at Wind Gap, Pa., when Esso Standard Oil Co. celebrated the official opening of this big hole in the ground. The abandoned quarry has been converted for underground storage of home heating oil. A helicopter piloted by Courtney Rockefeller (remotely related to John D.) lifted the veil covering the mammoth Esso sign painted on the floating pontoon roof. Capacity of the hole: one million barrels. Steel requirements: less than 10 per cent the amount needed for conventional surface storage. The project cost approximately $500,000.

TRENDS—I.P.A.A. supply and demand committee forecasts 1955 total demand at 8,370,000 bbl. daily for a 3.1 per cent increase over 1954. . . . Domestic demand for 1954 now set at 7,764,000 bbl. daily, or 1.8 per cent over last year. . . . ¶Du Pont survey of 48 cities shows the octane number of premium gasoline has increased 2.5 numbers in 2 years while regular has jumped almost 2 numbers. . . . ¶In the Rockies the emphasis is on market-demand proration. . . . Current activity indicates middle of next year may see stronger conservation laws on the books, plus a new law for productionless Idaho. . . .

EXPLORATION—Arizona becomes thirtieth producing state with Shell's successful wildcat in Apache County. . . . Well flowed 2,200 M.c.f. of gas and 11 bbl. of oil daily. . . . ¶Gulf-Phillips deep test in Delaware basin completed with flow of 65,000 M.c.f. of gas daily. . . .

IMPORTS—Big step taken by I.P.A.A. . . . Association comes out flatly for legislation to curb imports. . . . Resolution calls for a bill creating import formula, quotas, tax or tariff on foreign oil, or a combination of all of them. . . . Action is a reversal of I.P.A.A.'s not too successful diplomatic program. . . . ¶Jack Woodward, TIPRO president, blames excessive imports for oversupply that holds Texas to 15 days production. . . . He warns Rocky Mountain listeners Texas is tired of carrying the load of market demand proration. . . .

INTERNATIONAL—Shell plans to spud wildcat about first of the year in the Persian Gulf, about 5 miles from shore of Qatar. . . . ¶Iranian oil agreement clears lower house of Parliament with only slight opposition. . . .

PRODUCTION—Humble gets Railroad Commission approval to attempt conventional water flood in Spraberry. . . . Company plans five-spot pilot flood to test successful experiments in lab. . . . ¶Shell completes twelfth installation of equipment for automatic lease operation, plans to put seven more leases on push-button operation next year. . . . ¶La Gloria field operators authorized to expand cycling operations. . . . Action may bring first big test of state and federal authority over gas production since FPC's Order 174-A. . . . Gas to be used in additional cycling will come out of supplies now going to Texas-Illinois Natural Gas Pipe Line. . . . ¶Union's Reece Taylor speaks out strongly against any type of conservation law for California, particularly market-demand proration and compulsory unitization.

O.W.I.U. may drop "unloaded gun" in...

New Approach to Pay Demands

- **Union is disappointed that oil companies haven't come through with the 5 per cent wage increase it has sought**
- **Pending mergers are aimed at developing a stronger club to swing at refiners if companies balk at pay hikes**

Joe Reilly

THE disgruntled Oil Workers International Union next week is expected to reload its favorite negotiating weapon—the strike threat.

Once on the warpath, the O.W.I.U. probably will line up its forces for a possible nationwide strike next spring.

Specific threat to the uneasy labor-management truce in the oil industry is the anticipated withdrawal of a no-strike pledge by the O.W.I.U. policy committee. This pledge, frequently referred to as the "unloaded gun" policy, was announced last spring. So far, it has failed to produce the requested pay increase of 5 per cent "or its equivalent," which O.W.I.U. set as its goal this year.

If a strike is called, chief labor strategist, of course, will be O. A. (Jack) Knight, smooth, dimimutive president of the big O.W.I.U.

Disappointed at the refusal of oil companies to meet union pay demands, O.W.I.U. chieftains have scheduled a special meeting November 11 to reconsider their no-strike agreement. Although he doesn't dictate policy, Knight obviously feels the committee will knock down the only technical barrier now preventing a walkout.

Strike power sought . . . "There is a strong possibility that our policy committee at its meeting November 11 will take a sharp look at our policy and may revise it to the extent of withdrawing our no-strike pledge," Knight told The Oil and Gas Journal. "That, at least, will be my recommendation."

Knight has denounced the no-strike truce as a dismal failure. Most of the companies with which O.W.I.U. negotiates "have refused to even discuss the wage question with us," he lamented.

The O.W.I.U. president said bargaining conferences will be reopened if the no-strike pledge is lifted. "It is hoped the threat of a strike will encourage more realistic negotiations."

The policy committee was summoned to a special meeting after the proposed merger of O.W.I.U. with the United Gas, Coke and Chemical Workers Union was postponed *(The Oil and Gas Journal, October 25, page 70).* Postponement of the merger called for reshuffling the timetable which O.W.I.U hoped to follow in building up its strength and prestige.

Merger still pushed . . . Although the oil workers still expect to merge with the chemical workers and to attract many independent oil unions into the one big fold, removal of the strike barrier now takes precedence over these long-range goals. If O.W.I.U. can enforce its demands for wage increases, it will greatly enhance its prospects of strengthening its membership by uniting with smaller unions, many of which are reluctant to join.

A successful strike—or threatened strike—is Knight's big opportunity to increase his stature in the labor world and to enhance his value to the C.I.O., of which he already is a vice president.

Strike plans . . . If a strike is called, it will be carefully planned in advance. Knight is keenly aware that his O.W.I.U. will need some outside help to conduct a successful strike.

Most effective way to shut down the oil industry would be to close marketing facilities, but this is impossible, says one O.W.I.U. official. Next best bet, he figures, is to organize pipeliners. This is considered worthy of future consideration, although the union finds it hard to organize isolated pump-station operators who in many cases live in company houses.

By process of elimination, O.W.I.U. concludes it can deal its most devastating blows at the refinery. That's where its membership is strongest. If enough refineries are blockaded, both the oil industry and the general public will be at the mercy of the union.

In the last general strike in 1952, O.W.I.U. and 21 smaller unions were able to shut down about 50 refineries, representing slightly more than one-third of the nation's refining capacity. Although many bulk storage plants were picketed, non-struck plants kept a fairly steady flow of gasoline going to the motoring public. Gasoline shortages were localized. The unions, seeking a general wage increase of 25 cents an hour, settled for 15 cents plus small hourly differentials for night work.

A strike of such limited coverage likely would be far less effective today. Since the nation's refineries are operating at only 80 to 85 per cent capacity, well organized picket lines would be needed to make the strike effective. Some refiners would almost welcome the opportunity to shut down operations long enough to let demand catch up with supply.

The gamble . . . A merger with the Gas, Coke and Chemical Workers, now expected to be accomplished about February or March, would improve Knight's chances of conducting a successful strike. Although the merger would not greatly increase the union's strength in the oil industry, the combined union would hold a heavy club over the highly competitive petrochemical industry.

The C.I.O. combine, to be known as the Oil and Chemical Workers International Union, could harass the petroleum industry on several fronts simultaneously. Since more union members would be involved, the new organization also might expect more cooperation from other labor groups than was received in 1952.

A nationwide strike by oil and chemical workers would give Knight the helpful limelight of publicity. He is a candidate for presidency of the new union and his election seems almost assured since the O.W.I.U. membership is greater than that of the chemical workers. Winning substantial wage hikes when many unions are reluctant even to ask for a raise would be another feather in Knight's war bonnet.

What's more, it would aid his fight in drawing other unions into what he hopes eventually will be one of the biggest unions in the vast C.I.O. family.

Weakness an asset . . . Ironically, however, one of Knight's greatest selling points in trying to annex independent oil unions is O.W.I.U.'s own inability to win a wage boost. The only hope of bargaining on even terms with the mammoth oil industry, he contends, is to form a mammoth union.

"The results have been nil," he says in discussing O.W.I.U.'s experiment with the "unloaded gun" policy. "No company has been willing to sit down

Who's This Man, Jack Knight?

O A. (JACK) KNIGHT, president of the Oil Workers International Union, is an ex-refinery worker with a crusader's zeal for improving the lot of the working man, the C.I.O., and Jack Knight.

A stillman by trade, Knight became active in the labor movement in 1933 when he helped organize workers at the old Shell refinery in East Chicago, Ind., where he worked from 1926 to 1937.

He helped form Hammond, Ind., Local 210 of the A.F. of L. International Association of Oil Field, Gas Well and Refinery Workers. In 1936, when this union was reorganized into O.W.I.U. to help form the C.I.O., Knight was off to a running start on a long and sometimes turbulent labor career.

Knight became a member of the new organization's International Executive Council, and a year later he went to California as C.I.O. staff representative. In 1940, just 3 years after quitting his refinery job, he became top man in O.W.I.U.

Knight was rewarded for his successful leadership of the oil workers in 1947 when he was elected vice president of the parent organization. Today he is one of eight union heads serving as vice president of the C.I.O., a vast group of 32 unions bargaining for some 6,000,000 workers.

Knight without armor . . . Who is this Jack Knight?

He is a small, wiry, soft-spoken man of 52 with thinning gray hair and a high-school education. He is a neatly dressed, poised individual who can talk the language of both labor and management. He is a resident of Denver, but he lives out of his suitcase nearly half the time as he dashes back and forth across the country and sometimes in and out of Latin America. He is one of the airlines' best customers. He is an avid reader, an energetic trout fisherman, a meticulous flower gardener.

One of 13 children, Knight was born September 24, 1902, at New Hampton, Iowa.

His close friends will tell you Knight would have succeeded in whatever business he entered. He would not look out of place at a meeting of an oil company's board of directors. Although his weight never varies much from 150 pounds, his piercing eyes, erect stance, and cock-sure attitude give the impression of a much larger man.

He seldom raises his voice unless he is extremely irritated, or is addressing a union meeting. Employes at union headquarters in Denver say one of his greatest faults as a boss is that he's too easy-going.

Knight's future . . . But oil companies don't find him easy-going when it comes to discussing union contracts. To them, he's a John L. Lewis, only on a smaller scale.

Knight stirred up his greatest furor 2 years ago last spring. As leader of a coalition of 22 unions, including his own O.W.I.U., Knight masterminded a nationwide strike against the oil industry. Although the strike did not bring the full pay increase demanded, it resulted in general wage boosts. And it brought Knight his first nationwide recognition as a labor leader.

Walter Reuther, C.I.O. president, recently made it clear Knight is on

the first team. In September, when a large segment of the C.I.O.'s United Gas, Coke and Chemical Workers Union shunned the proposal to merge with Knight's Oil Workers, Reuther stepped in and announced bluntly that the balky union need expect no more financial assistance from C.I.O. if it voted down the merger. Result: The merger was approved by a vote of 667 to 192. With Reuther's blessing, Knight appears destined to be president of the combined union.

The O.W.I.U. president is now threatening to start waving the strike club again. Whether or not the O.W.I.U. actually walks out, Knight will make his share of headlines in the next few months.

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with us and discuss a wage increase on a reasonable basis. . . . There has been no realistic approach by management."

Despite the fact that Knight is now putting greatest emphasis on O.W.I.U.'s immediate goals rather than its long-range merger plan, he has not abandoned the latter. This is evident in the fact that O.W.I.U. recently got representatives of independent oil unions to release it from its no-raiding pledge. Also indicating the importance of the merger movement is C.I.O. President Walter Reuther's threat virtually to disinherit the chemical workers if they refused to join forces with O.W.I.U.

It's not surprising that Knight is held in such high regard by the C.I.O. Membership of the Oil Workers International Union has increased about five-fold since Knight became president in 1940. Most of the growth occurred between 1943 and 1947.

Union history . . . The organization, at first known as the International Association of Oil Field, Gas Well and Refinery Workers, was founded by the A. F. of L. in 1918. It prospered during the 1920's, then almost withered away during the depression years.

O.W.I.U. was one of the original unions forming the C.I.O. Although Knight refuses to disclose its actual membership, he claims the union represents approximately 125,000 members for bargaining purposes.

Top C.I.O. officials look on the still-expanding oil, gas, chemical, and allied fields as one of the most fertile regions for future union expansion.

The Gas, Coke and Chemical Workers Union represents approximately 100,000 workers and the 31 independent unions involved in merger talks with O.W.I.U. have a combined representation of about 82,000 workers. Total membership undoubtedly is well below the number of workers "represented."

Uniting of these various organizations would form a union with an actual membership of perhaps 235,000

workers, according to the best estimates available from the U. S. Department of Labor.

C.I.O. goal . . . But C.I.O. plans for expansion do not stop there. Canada has 43,000 potential members of an oil-gas-chemical union, of which only about 19,000 are now organized. In addition, hundreds of thousands of non-union men are employed in the oil industry as pumpers, roustabouts, pipeliners, and in other jobs hardly touched by the O.W.I.U.

Future efforts of the C.I.O. may be directed at more widespread organization within the petroleum industry if the oil-chemical union is to become "the biggest in the nation." This possibility was suggested recently by Elwood D. Swisher, president of the Gas, Coke and Chemical Workers and likely candidate for vice president of the new union.

Although reluctant to discuss potential membership of the proposed oil-gas-chemical organization, an O.W.I.U. official pointed out that such an organization conceivably could have up to 2,000,000 members. Half that many would make the proposed union rank alongside the largest in the nation—steel, auto, and teamsters unions.

But Knight is a practical man, and rather impatient. He would rather discuss the demands he hopes to enforce immediately than to dwell on the nebulous possibilities of the distant future. And he doesn't want to give small unions the impression O.W.I.U. is trying to "swallow" them.

Present strategy . . . His plan for the immediate future is to continue negotiations in cases where contracts have expired and open new negotiations as more agreements run out. By continuing negotiations until many of the more than 700 O.W.I.U. contracts are up for renewal, the union then would have a lot of strike strength lined up in event a shutdown is called.

Whether or not he gets the requested 5 per cent wage increase, Knight hopes gradually to get more companywide contracts.

"Companywide contracts are still a goal, but nothing imminent," explained Knight. "There is a time for everything, and we will act on this at the best time. The industry will not be shut down next week on this question.

"We believe, however, that where contracts are decided in New York, they should be negotiated in New York."

Although the oil industry pays among the highest wages in the country, Knight is bitterly aware that pay has gone up faster in some other industries in recent years than in the oil industry. Figures provided by the Bureau of Labor Statistics show the average hourly wage for refinery workers, for example, has risen only 144 per cent since 1939 as compared with 194 per cent in the chemical and allied industries and 218 per cent in non-metallic mining. These statistics indicate the possibility that chemical workers may profit more from the merger with O.W.I.U. than will oil workers.

Knight's economics . . . Knight believes the pay of highly skilled workers, in particular, should be raised. The goal of a 5 per cent wage increase "or its equivalent" leaves it up to local unions whether the wage boost shall be straight across the board or based on percentage of present earnings.

"The oil industry has picked the cream of the crop of American working men and women," Knight says diplomatically. "Under these circumstances, the industry should continue to maintain top wages in this field of mass production. Profits are as good as, or better than, ever before."

Knight says the oil industry must promote prosperity by increasing wages so that oil workers can buy other products.

"Productivity per employe is increasing," he argues. "If wages are not increased, productive capacity will outstrip purchasing power. Surplus goods and no buyers means the first step toword a depression."

More Crude Cuts Posted

MOUNT PLEASANT, Mich.—More companies have announced adjustments in crude prices in both Michigan and the Illinois basin.

Ohio Oil Co. reduced its Illinois basin flat posting 7 cents a barrel to $2.95 and Plymouth crude to $2.62, also a reduction of 7 cents. The scheduled posting for eastern Illinois and western Indiana was cut to $2.95 for oil of 35° and above with a 2-cent differential per degree down to $2.81 for oil below 29°. The changes were effective October 23.

Downward adjustments in prices paid for Michigan crudes were posted by three of the largest crude buyers there. Simrall Division of Roosevelt Oil & Refining Corp., Leonard Pipe Line Co., and Bay Pipe Line Corp. announced reductions ranging from 2 cents to 18 cents a barrel, effective October 16.

The crude buyers announced that the cuts were necessary to permit Michigan crude to be delivered to local refineries at prices competitive with out-of-state crude now being delivered to them.

Arizona Is Added

Shell well flowed 11 bbl., 2,200 M.c.f. daily on test

WINSLOW, Ariz.—Arizona has been established as the nation's thirtieth producing state with a well completed by Shell Oil Co. It is the third state brought into production this year by Shell.

Shell's Arizona wildcat, 2 East Boundary Butte, in Apache County in the far northeastern corner of the state was shut in last week after flowing gas at a daily rate of 2,200 M.c.f. through a ⅜-in. choke from plugged back depth of 4,884 ft. During a 13-hour test, the well produced fluid at the rate of 32 bbl. daily. Of this flow, 11 bbl. daily was oil. Production is from the Pennsylvanian.

The wildcat is located in SE NW 3-41n-28e, 3½ miles west of the gas well Shell completed last June at 1 Boundary Butte (A on map). Shell recovered gas and some oil shows in the earlier test from the Hermosa (Pennsylvanian) group. The well gaged 1,200 M.c.f. of gas daily, but later dropped to 600 M.c.f. Gas from this earlier well was used as fuel in drilling the 2 Boundary Butte discovery.

The new discovery is about 8 miles southeast of Utah's Boundary Butte field and is probably an extension of that field. The Boundary Butte area is located in the Black Mesa basin.

More Arizona work . . . South of Yuma in the opposite corner of Arizona, Colorado Basin Associates, Inc. was scheduled last week to start a 5,000-ft. test in the NW 19-9s-23w, Yuma County. The company, made up of Phoenix and Yuma businessmen, plans two additional tests in the area. The second is slated for SW 17-10s-23w. Fowler Drilling Co. of Long Beach was slated to move in a rig last week to start.

Previously this year, Shell established South Dakota and Nevada as producing states.

I.P.A.A. Shifts Gears

Association abandons diplomacy as the way to cut imports, calls for a push to get Congress to legislate them down

Paul Swain

TULSA.—The nation's independent oil producers last week abandoned a year-long program of diplomacy aimed at reducing imports of foreign oil and launched a concerted effort to build a tariff wall to protect themselves.

More than a thousand members of the Independent Petroleum Association of America adopted a resolution instructing association officers to begin work on a legislative program to present to the next session of Congress. It was a step other oil industry associations have avoided and one which the I.P.A.A. refused to take just a year ago. Since then the association has undertaken to sell importing companies on reducing imports voluntarily.

Presenting the resolution to the group, W. L. Stewart, Fort Worth oil operator, admitted "some progress" was made in the 12-month effort at diplomacy.

"But," Stewart said, "the time has come for an intensive and active fight against the foreign oil that is gradually strangling us."

The resolution charts four possibilities that the I.P.A.A. staff might adopt in making up a program to present Congress. They are:

. . . **The suggested reciprocal trade** plan or some modification that would do the job. This plan was devised by the import policy and executive committees of the association several months ago *(The Oil and Gas Journal, page 97, July 5)*. The formula would give each foreign country a quota determined by its total purchases of United States merchandise the preceding year. All imports above that quota would pay $1.05 a barrel.

The formula is so set up that it would operate exclusively against Eastern Hemisphere imports. No country shipping oil to the United States from the Western Hemisphere would be affected.

. . . **A tax or tariff** of $1 per barrel or such other amount that will be adequate.

. . . **A quota plan.**

. . . **Any combination of the three** or any other legislative plan that will prevent excessive oil imports.

The resolution stated flatly that the present rate of imports "is seriously damaging, and if not corrected, will destroy the domestic petroleum industry."

The resolution was passed unanimously a day after W. M. Vaughey, association president, had expressed a more tolerant view. The Jackson, Miss., independent operator, who was re-elected as president, emphasized the importance of American investments in foreign oil production. He pointed out that foreign oil not only contributes to world progress, but "is instrumental in further providing for our security at home."

Vaughey suggested a limitation of 800,000 bbl. daily in imports "at the present low import rates."

Import opposition . . . The I.P.A.A. action also came less than a week after The Texas Co. called any effort to limit American access to foreign crude an "unwise national policy" *(The Oil and Gas Journal, October 25, page 74)*.

In a statement to the Cabinet Committee on Energy Supplies and Resources Policy, Texaco said any effort to restrict Eastern Hemisphere imports is "directly contrary to our nation's long-standing reciprocal trade agreements program, and clearly unthinkable as a basis for American commercial dealings with friendly nations."

The Texas Co., second largest domestic producer urged the committee to take no action which would "restrict the movement of foreign oil to meet American needs."

Cost study . . . In other action, the association instructed its officers to explore the possibilities of forming an industry-wide foundation to make a continuing study of industry expenditures and costs of replacing crude reserves.

The association's cost study committee warned that the oil industry "is in effect selling off its shelves goods which cannot be replaced at anything like their original cost." If the nation is to have an adequate oil reserve, new oil must be found to replace current production. The fact that this search for new oil and its production costs so much more than the oil now being produced led the committee to recommend the industry-wide study.

The committee conceded that percentage depletion comes closer than anything else to meeting the need to set aside current revenue to be applied to the search for new oil reserves, but declared it does not provide enough to meet expanding requirements.

"Consequently, it has been necessary over the years for the oil industry to retain a substantially greater proportion of its earnings than other industries."

New Gas Law Urged

McCollum says education of public will be needed first

TULSA.—A legislative "operation" to remove the "cancerous growth" of federal control must be performed quickly if the oil and gas industry is to survive.

The surgery can be performed only if it is supported by public opinion, L. F. McCollum, president of the Continental Oil Co., told the I.P.A.A. here at its twenty-fifth annual meeting. He said the industry recognizes the threat involved in the Phillips decision and the action of the Federal Power Commission, but he warned that congressional action will be possible only if the industry sells its story to the consuming public.

McCollum furnished his listeners with some sales points to use in presenting the natural-gas case to American housewives. He pointed out that in 1953 the producer received less than 10 per cent of the cost of gas to the consumer. The remaining cost is in transmission and distribution.

McCollum declared the average gas consumer would save only 23 cents a month if gas producers gave their gas outright to transmission companies. He compared this saving to the price of "a pack of cigarets a month."

"Our job," McCollum said, "is to let Mrs. America know what federal regulation of field gas prices will mean to her—not in technical or legal terms, but in terms of her own every day experiences of cooking, cleaning, washing and keeping warm."

Fell Retiring from I.P.A.A.

TULSA.—Harold B. Fell, who presided at the organizational meeting of the Independent Petroleum Association of America at Colorado Springs in 1929 and has served as executive vice president of the association 21 years, will retire February 1.

Fell's retirement from the association post was disclosed here last week by W. M. Vaughey, president, who said the executive vice president's position will not be filled "immediately." Fell, president of Simpson-Fell Oil Co. and Rickey Royalty Co., Ardmore, Okla., will devote more time to his private business.

Recognized as an industry leader, Fell has been actively engaged in the

NATURAL GAS shared the target area with imports as the I.P.A.A. held its twenty-fifth annual meeting in Tulsa. R. C. Kay, Amarillo, chairman of the association's natural-gas committee, presents a resolution calling for legislation to exempt producers from Federal Power Commisison authority. It was passed immediately. Seated (left to right) are Clayton Orn, general attorney for Ohio Oil Co., Findlay, Ohio; D. L. Connelly, Warren Petroleum Corp., Houston; and Russell B. Brown, general counsel of the I.P.A.A., Washington.

oil and gas producing business more than 31 years.

I. C. (Cleve) Huff, Jr., was elected secretary and executive manager of the association. Huff succeeds C. E. Buchner, who retired as I.P.A.A. executive manager June 1.

The association re-elected Vaughey, president; Russell B. Brown, Washington, D. C., general counsel; and C. L. McMahon, Tulsa, treasurer.

Oil Venture Planned

New firm would develop vast holdings in Texas

NEW YORK.—A proposal to create the TXL Oil Corp. to handle vast oil and gas properties of Texas Pacific Land Trust will be presented to certificate holders of the trust at a meeting November 22.

If the plan is approved, the new company will be authorized to explore and develop oil and gas properties on much of the land held by the trust. At the end of 1953, the trust held surface or mineral rights covering approximately 1,797,000 acres in 29 Texas counties.

Under the plan, TXL Oil Corp. would exchange 5,574,356 shares of its stock for all the oil, gas, and mineral rights of the properties owned by the trust, with the exception of limited nonparticipating royalties to be retained. Surface rights are to be held by the trust.

Trust properties, about 25 per cent of which are under lease, have 1,137 operating oil wells. Last year the trust had an income of $7,108,000 from the properties which would be transferred to TXL.

Each sub-share certificate holder in the trust would receive four shares of stock in the new corporation and would retain his proportionate interest in assets of the trust.

The proposed board of directors of the new corporation would include Francis S. Baer, senior vice president and director, Bankers Trust Co.; Frederick L. Ehrman, partner, Lehman Brothers; George C. Fraser, trustee, Texas Pacific Land Trust; V. Theodore Low, partner, Bear, Stearns & Co.; Frank M. Porter, president, American Petroleum Institute; T. Rieber, president, Barber Oil Corp.; C. G. Rice, vice president and director, United States Smelting Refining & Mining Co.; and George Roberts, partner, Winthrop, Stimson, Putnam & Roberts.

It is proposed that Fraser will serve as chief executive officer until a permanent chief executive is selected.

Oklahoma Allowable Set

OKLAHOMA CITY.—The Oklahoma Corporation Commission voted to continue the October oil allowable of 495,000 bbl. daily through November. The Bureau of Mines estimated demand for Oklahoma crude at 530,000 bbl. daily for November, the same as for October.

Industry Briefs

OLEAN, N. Y.—C. J. Simpson of C. J. Simpson Drilling Co., Dallas, has purchased the Socony-Vacuum Oil Co., Inc., 7,150-bbl. refinery here. The plant, one of the oldest in the United States, has been for sale since May. Socony decided to close it because of the decreased supply of crude in this area. Simpson will dismantle the plant and ship some of it to Cuba, where he has oil interests. He will sell the 112-acre tract, which includes several buildings.

CODY, Wyo.—Husky Oil Co. has acquired the H. Earl Clack Co., Havre, Mont., the largest independent marketing firm in the West. Husky acquired 200 wholesale and retail outlets in an area extending from western North Dakota to the Cascade Mountains in Washington. The company also acquired Clack's interest in the Yellowstone Pipeline Co., a recently completed products line between Billings, Mont., and Spokane, Wash. Under the change, H. Earl Clack Co. will become H. Earl Clack, Inc. H. Earl Clack, the former president, will become chairman of the Clack organization and a director of Husky. Turner Clack, his son, will become president of the Clack, Inc.

BATON ROUGE.—Louisiana's oil-production allowable for November has been set at 610,654 bbl. daily, an increase of 8,509 bbl. over the October quota.

OKLAHOMA CITY. — Dedication ceremonies for the new office building of Interstate Oil Compact Commission will be held here November 16. Oklahoma Governor Johnston Murray will present the keys to the building to Earl Foster, executive secretary of the commission. The Interstate Commission is a group of 28 states pledged to aid the petroleum industry through conservation programs.

NEW YORK.—Cities Service Petro-leum, Inc., has launched the 38,000-ton SS Liberty Bell, the last of four identical tankers constructed for the company this year. The ship, named in honor of Philadelphia, cost $9,500,-000, and has a capacity of 336,000 bbl.

LITTLE ROCK.—W. R. Stephens Investment Co. here has purchased 51½ per cent of the stock of Arkansas Louisiana Gas Co. from the Cities Service Co. Stephens purchased 1,958,030 shares at a price slightly above the market price. The stock closed at 11⅜ shortly before the transaction was made.

1955 Demand Forecast Up 3 Per Cent

TULSA — Total demand in 1955 is expected to average 8,370,000 bbl. daily, an increase of 3.1 per cent over 1954. Domestic demand is expected to be up 4.0 per cent in contrast with a decrease of 16.2 per cent in exports.

These forecasts were contained in a report prepared by the supply and demand committee of the I.P.A.A. and presented here at the annual meeting of the association.

The committee also brought up to date its estimates for 1954. Domestic demand for this year is now forecast at 7,764,000 bbl. daily for a gain of 1.8 per cent over 1953, but the 12.7 per cent reduction in exports will hold total demand to a gain of 1.0 per cent.

A net decrease of 3,000 bbl. daily is predicted for stocks of crude and products in 1955. Since this represents only a small change from the increase of 14,000 bbl. daily in 1954, most of the 3.1 per cent gain in total demand will be reflected in increased new supply.

Total new supply for 1955 is projected at a gain of 2.9 per cent over 1954, but the gain is not expected to be evenly distributed among the supply sources.

The committee did not forecast imports as such but did give estimates of domestic production, qualified by the assumption that oil imports will "follow recent trends and such schedules as have been filed with the Texas Railroad Commission." These production data subtracted from total supply gives indicated imports.

Crude production is expected to increase 139,000 bbl. daily over the reduced production in 1954 or 62,000 bbl. daily over 1953.

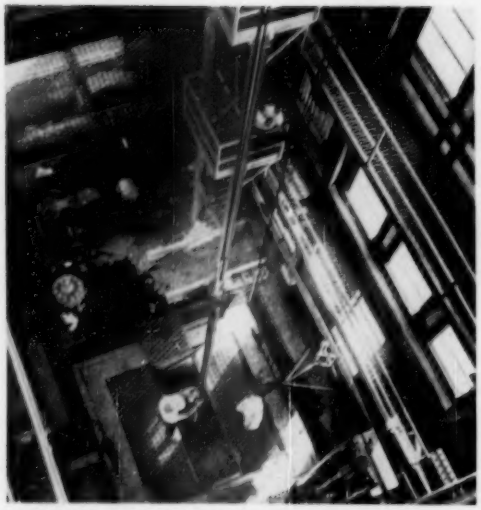
The crude production gain over 1954 of 2.2 per cent combines with an increase of 3.6 per cent for natural-gas liquids for a boost in total domestic production of only 2.3 per cent in contrast with the gain of 7.0 per cent indicated for imports.

U.S. Petroleum Supply and Demand Forecast

(Thousands of barrels daily)

	1954			1955									
				First quarter		Second quarter		Third quarter		Fourth quarter		Year	
TOTAL DEMAND:	Third quarter	Fourth quarter	Year	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change
Gasoline	3,658	3,415	3,469	3,250	2.7	3,745	3.1	3,790	3.6	3,515	2.9	3,575	3.1
Kerosine	200	455	339	515	1.4	195	1.0	195	—2.5	465	2.2	342	0.9
Distillate	1,013	1,840	1,510	2,225	7.2	1,160	4.1	1,070	5.6	1,905	3.5	1,590	5.3
Residual	1,285	1,630	1,515	1,750		1,425	2.0	1,325	3.1	1,635	0.3	1,534	1.3
Other	1,420	1,280	1,282	1,200	7.5	1,325	4.0	1,455	2.5	1,335	4.3	1,329	3.7
Total	**7,576**	**8,620**	**8,115**	**8,940**	**3.8**	**7,850**	**3.1**	**7,835**	**3.4**	**8,855**	**2.7**	**8,370**	**3.1**
EXPORTS:													
Gasoline	98	85	92	75	— 8.5	80	—21.6	75	—23.5	75	—11.8	76	—17.4
Kerosine	10	15	15	15	—25.0	10	—28.6	10		10	—33.3	11	—26.7
Distillate	60	65	63	50	— 7.4	55	—25.7	55	— 8.3	50	—23.1	52	—17.5
Residual	70	65	72	60	—18.9	60	—25.0	55	—21.4	55	—15.4	58	—19.4
Other products	70	65	70	65	— 1.5	65	—18.8	60	—14.3	60	— 7.7	63	—10.0
Crude	40	35	39	35	— 2.8	35	—20.5	35	—12.5	30	—14.3	34	—12.8
Total	**348**	**330**	**351**	**300**	**— 9.6**	**305**	**—22.6**	**290**	**—16.7**	**280**	**—15.2**	**294**	**—16.2**
DOMESTIC DEMAND	**7,228**	**8,290**	**7,764**	**8,640**	**4.3**	**7,545**	**4.5**	**7,545**	**4.4**	**8,575**	**3.4**	**8,076**	**— 4.0**
TOTAL STOCK CHANGE	**267**	**—359**	**14**	**—467**		**318**		**402**		**—274**		**—3**	
REQUIRED NEW SUPPLY	**7,843**	**8,261**	**8,129**	**8,473**	**3.4**	**8,168**	**— 0.1**	**8,237**	**5.0**	**8,581**	**3.9**	**8,367**	**2.9**
DOMESTIC PRODUCTION:*													
Crude	**6,236**	**6,418**	**6,389**	**6,553**	**2.8**	**6,401**	**— 1.9**	**6,496**	**4.2**	**6,653**	**3.7**	**6,528**	**1.7**
Natural, etc.	**650**	**693**	**674**	**705**	**1.9**	**682**	**3.3**	**686**	**5.5**	**718**	**3.6**	**698**	**3.6**
IMPORTS†	**957**	**1,150**	**1,066**	**1,215**	**8.2**	**1,085**	**9.6**	**1,055**	**10.2**	**1,210**	**5.2**	**1,141**	**7.0**
RUNS TO STILLS	**6,920**	**7,076**	**6,988**	**7,188**	**3.0**	**7,046**	**1.6**	**7,141**	**3.2**	**7,313**	**3.3**	**7,174**	**2.7**
CLOSING STOCKS (millions of bbl.):													
Gasoline	151	160	160	180	— 0.7	160	— 3.3	145	— 4.0	155	— 3.1	155	— 3.1
Kerosine	38	29	29	18	2.6	28	— 0.6	38		28	— 3.4	28	— 3.4
Distillate	128	110	110	60	— 0.4	87	0.8	130	1.6	112	1.8	112	1.8
Residual	57	50	50	45	1.6	50	— 0.4	55	— 3.5	52	4.0	52	4.0
Other products	118	114	114	118	3.2	125	— 0.7	119	0.8	115	0.9	115	0.9
Crude	274	270	270	270	— 0.7	270	— 5.3	270	— 1.5	270		270	
Total	**766**	**733**	**733**	**691**	**0.2**	**720**	**— 2.8**	**757**	**— 1.2**	**732**	**— 0.1**	**732**	**— 0.1**

*The committee reported it did not have complete information on which to determine reliably imports for 1955, but that if imports follow recent trends and such schedules as have been filed with the Texas Railroad Commission, production of crude and natural-gas liquids can be expected to reach the totals shown in the table. †The committee did not forecast imports as such. The averages in this table represent the differences between required new supply and domestic production of crude and natural-gas liquids.



DRILLING LABORATORY technicians guide a testing tool into a 60-ft. cased hole excavated beneath Carter's new drilling research building. The well hole is used to test new types of drilling tools.

AN OIL FIELD has been scaled down from a field of 100 miles square and 6,000 ft. deep into a room 15 ft. square and 12 ft. deep in Carter Oil Co.'s new laboratories. The type of rock structure, fluid pressures, rate of flow, and various injection patterns can be simulated. George Binder sets up a flooding pattern.

Carter's Expanded Labs Dedicated

Kenneth B. Barnes

TULSA.—Carter Oil Co. last week dedicated the third major expansion of its multimillion dollar petroleum research laboratories here.

The additions include a large, new research building containing 56 rooms and much new scientific equipment, and a 50-ft. high drilling research tower where actual drilling operations can be carried on as from a steel derrick. Carter's three expansions cover a research program dating back 20 years.

Wallace E. Pratt, internationally known geologist, addressed the large group of educators, scientists, and petroleum industry leaders present at the ceremonies on "Oilfinding Is Geologic Research."

Pratt, former vice president and director of Standard Oil Co. (N.J.), paid tribute to past Carter research effort.

"It has improved drilling tools and practices," he said. "It has clarified . . . the old question of the origin of oil; the migration and accumulation of oil; the vast improvement of apparatus and techniques for seismic-reflection mapping."

The new additions increase the research facilities at Carter 50 per cent. Carter's Tulsa research organization is now divided into six units: geophysical engineering, geophysical research, geological research, drilling methods research, exploitation, recovery methods.

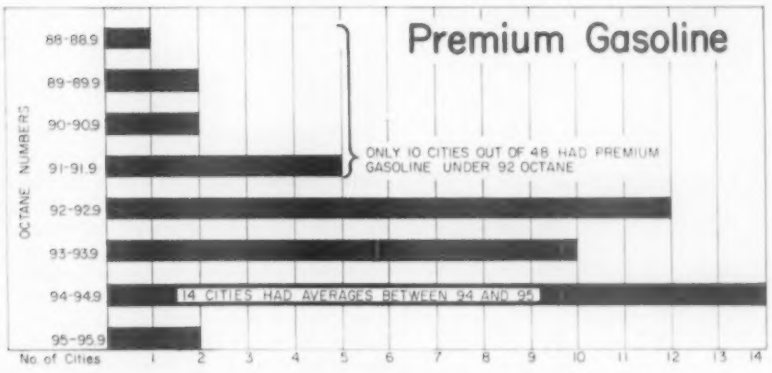
Check List of Petroleum Research Labs in the U. S.

Editors Note: Several new petroleum laboratories have been put into operation recently, and The Journal has carried news stories, engineering articles, and photographic treatment of these labs. Because of the high interest and continued expansion in this field, a list of petroleum research laboratories is presented below. (R) designates refining and processing installations while (P) designates drilling and producing labs. No designation is listed where all research is centralized. This compilation does not include laboratories maintained by colleges, universities, industrial and oil-equipment manufacturers, and service companies.

Atlantic Refining Co., Philadelphia (R), Dallas (P).
Carter Oil Co., Tulsa (P).
Cities Service Oil Co., New York (R), Tulsa (P).
Continental Oil Co., Ponca City, Okla.
Esso Standard Oil Co., Baton Rouge (R)
General Petroleum Corp., Vernon, Calif. (P), Wilmington, Calif. (R).
Gulf Research & Development Co., Pittsburgh.
Humble Oil & Refining Co., Houston (P), Baytown (R).
Magnolia Petroleum Co., Dallas (P).
Phillips Petroleum Co., Bartlesville, Okla. (P and R), Borger, Tex. (R).
Pure Oil Co., Crystal Lake, Ill.
Shell Oil Co., Houston (P), Emeryville, Calif. (R).
Sinclair Oil & Gas Co., Tulsa (P).
Sinclair Refining Co., Harvey, Ill. (R).
Skelly Oil Co., Pawhuska, Okla. (R).
Socony-Vacuum Oil Co., Paulsboro, N. J. (R).
Standard Oil Co. of Calif., San Francisco (R), La Habra, Calif. (P).
Standard Oil Co. (Ind.), Whiting, Ind. (R).
Standard Oil Co. of Ohio, Cleveland (R).
Standard Oil Development Co., Linden, N. J.
Stanolind Oil & Gas Co., Tulsa.
Sun Oil Co., Philadelphia (R), Beaumont (P).
The Texas Co., Beacon, N. Y. (R), Bellaire, Tex. (P).
Union Oil Co., Brea, Calif.
Warren Petroleum Corp., Tulsa (R).
Battelle Institute, Columbus, Ohio.
Mellon Institute, Pittsburgh, Pa.
Midwest Research Institute, Kansas City.
Southern Research Institute, Birmingham.
Southwest Research Institute, San Antonio.
U. S. Bureau of Mines, Bartlesville, Okla., San Francisco, Calif.
U. S. Bureau of Standards, Washington.

NEW WING with 19,600 square feet of floor space will increase laboratory facilities 50 per cent. Carter employs 230 skilled research staff members.

Octane Numbers Up 2.0, 2.5



Here's How the 48 Cities Compare

(Octane numbers are by research method, arithmetic averages by cities)

	PREMIUM				REGULAR			
	Octane number			TEL cont. cc./gal.	Octane number			TEL cont. cc./gal.
	Oct. 1953	July 1954	Oct. 1954	Oct. 1954	Oct. 1953	July 1954	Oct. 1954	Oct. 1954
Aberdeen	88.9	91.5	91.2	2.38	83.1	84.6	84.1	2.13
Amarillo	90.0	91.7	91.5	2.08	81.4	83.8	83.6	2.49
Atlanta	92.8	94.5	94.6	2.34	85.8	86.3	86.5	2.28
Bakersfield	89.8	91.3	92.2	2.90	81.8	83.7	83.9	2.00
Baltimore	93.1	94.5	94.6	2.64	87.5	89.2	89.2	2.32
Boston	92.9	94.4	94.8	2.25	87.4	89.3	89.8	2.28
Calgary	88.2	88.7	88.7	2.76	82.5	82.3	82.9	2.13
Casper	89.0	90.4	90.2	1.55	82.0	83.1	83.1	1.30
Charlotte	92.4	94.5	94.5	2.31	85.8	86.9	86.6	2.39
Chicago	90.6	92.4	92.2	2.20	84.0	84.7	85.0	2.05
Cincinnati	91.8	93.4	93.4	2.59	86.6	87.8	87.5	2.38
Cleveland	92.4	93.2	93.7	2.24	87.6	88.4	88.9	1.96
Columbus	92.1	93.1	93.6	2.57	86.7	87.9	88.4	1.88
Corpus Christi	92.1	94.1	93.9	2.73	84.8	85.4	85.9	2.27
Dallas—Fort Worth	92.9	94.6	95.3	2.48	84.9	85.9	86.3	2.12
Denver	89.2	89.9	90.4	1.93	81.8	82.7	83.1	1.50
Detroit	93.1	93.6	93.7	2.23	86.8	87.6	88.0	1.81
Edmonton	90.1	89.8	89.4	1.86	83.3	83.8	83.5	1.40
El Paso	90.2	92.4	92.8	2.89	81.3	82.6	82.6	2.60
Great Falls—Billings	90.9	91.6	92.6	2.13	83.3	84.2	84.7	1.94
Houston	92.6	94.8	94.9	2.53	85.3	86.2	86.8	2.28
Indianapolis	89.9	92.2	93.5	2.35	83.8	84.3	84.6	1.97
Jacksonville	92.0	94.4	94.9	2.06	86.0	88.0	89.0	2.32
Kansas City	90.4	91.9	92.1	1.88	83.8	84.4	84.6	1.85
Little Rock	92.5	94.5	95.3	2.71	85.3	85.6	86.4	2.55
Los Angeles	91.7	92.7	93.3	2.66	82.8	83.9	84.4	2.00
Louisville	92.0	93.9	94.2	2.77	85.4	86.6	86.4	2.55
Memphis	91.9	94.3	94.7	2.38	85.0	86.1	86.6	2.17
Milwaukee	94.0	93.9	93.6	2.33	84.2	84.4	84.6	2.01
Minneapolis	89.9	92.2	92.2	2.42	83.6	84.6	84.7	2.20
Montreal	91.8	92.5	92.1	1.74	86.6	87.9	87.7	1.67
Nashville	92.2	94.8	94.4	2.65	84.8	86.4	86.7	2.41
New Orleans	92.5	94.4	94.3	2.66	85.8	86.6	87.0	2.29
New York (Met. area)	92.8	94.0	94.5	2.49	87.4	88.7	89.3	2.21
Omaha	89.6	92.0	91.7	2.30	83.6	84.3	84.4	2.17
Philadelphia	92.7	94.5	94.7	2.25	87.4	89.4	90.3	2.30
Pittsburgh	92.3	94.3	94.6	2.32	87.6	88.9	89.8	2.44
St. Louis	90.3	92.0	92.3	2.52	83.6	84.0	84.7	2.26
Salt Lake City	88.7	89.6	89.8	1.49	80.4	81.3	81.8	1.65
San Francisco	91.8	92.9	93.7	2.63	82.3	84.2	85.1	2.10
Seattle	90.9	92.0	93.5	2.67	82.0	83.5	84.9	2.27
Shreveport	93.3	94.6	94.9	2.45	84.6	85.0	86.1	2.46
Spokane	90.8	92.2	92.8	2.24	82.3	84.4	85.1	1.78
Toronto	91.6	92.6	92.6	2.03	86.8	88.2	87.8	1.31
Tulsa	90.8	92.2	92.0	2.34	84.0	84.5	84.7	1.94
Vancouver	90.0	90.9	91.6	2.00	83.1	83.7	84.0	1.78
Wichita	89.6	91.2	91.6	2.22	83.0	84.1	84.0	1.70
Winnipeg	90.4	92.0	92.3	1.14	84.8	85.6	85.2	1.25

REFINERS have improved premium gasoline 2.5 octane numbers and regular gasoline almost 2 numbers in the past 2 years.

Premium gasoline in the 48 cities listed in the accompanying table had an average octane number of 93.0 on October 1 compared with 91.3 a year ago and with 90.5 on October 1, 1952. These averages are taken from the latest survey of the petroleum chemicals division of E. I. du Pont de Nemours & Co., Inc.

Improvement has been reported for every quarterly period but one since April 1952. The average was unchanged at 91.0 in the second quarter of 1953.

GENERAL COMPARISONS*

	Oct. 1952	Oct. 1953	July 1954	Oct. 1954
Premium—				
Research Oct. No.	90.5	91.3	92.8	93.0
TEL content (cc. per gal.)	2.25	2.34	2.43	2.32
Regular—				
Research Oct. No.	83.9	84.5	85.3	85.8
TEL content (cc. per gal.)	1.95	2.02	2.19	2.07

*Unweighted averages of 48 cities.

The highest area average for premium gasoline was on the East Coast, but the highest city average was in District 3. An average of 95.3 was reported for Dallas-Fort Worth and for Little Rock, but the district as a whole failed to come up to the average of 94.65 for the East Coast.

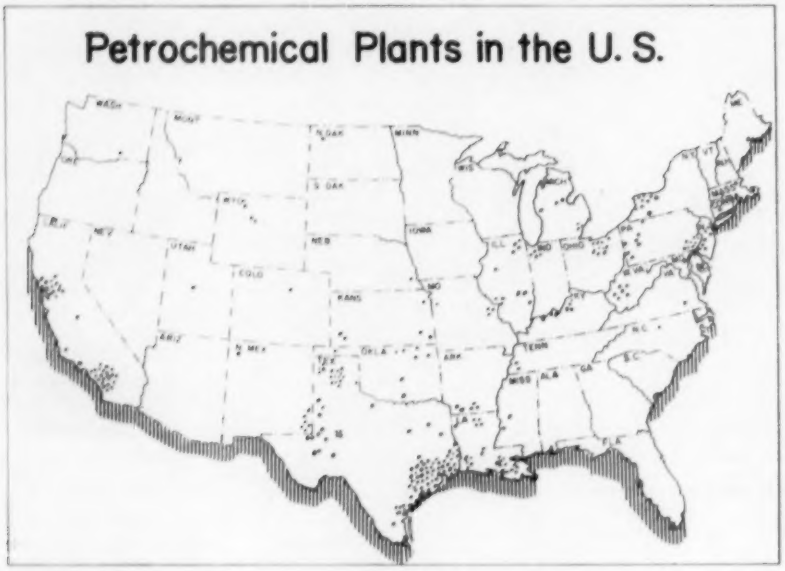
Regular gasoline with the highest octane number is marketed in Philadelphia. The regular in Philadelphia had a higher average octane number than premium gasoline in two Rocky Mountain cities.

Premium gasoline had a range in octane numbers from 88.7 to 95.3, but most of the city averages fell in the upper half of the range. Only 10 cities out of the 48 reported octane averages less than 92.

The distribution for regular gasoline ranged from 81.8 to 90.3, with 26 cities falling below 86 and 22 above.

COMPARISONS BY DISTRICTS OCTOBER 1954

	Cities in survey	Research Oct. No. Premium	Research Oct. No. Regular
PAW Dist. 1	8	94.7	88.8
PAW Dist. 2	17	92.9	85.8
PAW Dist. 3	8	94.1	85.6
PAW Dist. 4	4	90.8	83.2
PAW Dist. 5	5	93.1	84.7
Total U. S.	42	93.3	85.9
Canada	6	91.1	85.2



Will Gulf Coast dominate . . .

. . . Petrochemical Future?

F. Lawrence Resen

GALVESTON, Tex.—Is the bloom beginning to wear off the Gulf Coast petrochemical industry? Possibly, says Henry Groppe, Monsanto Chemical Co., Texas City, for general trends indicate that the Gulf Coast's dominance in the petrochemical field will dwindle slightly in the future.

This will be due primarily to increasing fuel and raw-materials costs and, to a lesser extent, to decentralization, growth of refining centers nearer market areas, and increasing water shortages, he told the ninth annual technical meeting of the South Texas Section, American Institute of Chemical Engineers.

However, these factors will be offset to some extent by the increasing use of low-cost water transportation, further integration, and the self-generating aspects of rapid growth. Once these trends begin to equalize the difference between the Gulf Coast and other areas, then labor supply, taxation, and other political factors will become increasingly important, he said.

Wall concurs . . . Groppe's conclusion was substantiated by J. E. Wall, Celanese Corp. of America, Bishop, Tex. Although present considerations make the Gulf Coast the favored area for locating a petrochemical plant, current trends could change the balance, Wall told the A.I.Ch.E. group.

In the first place, as research work makes possible the production of more pounds of product per pound of feed, the location of markets will assume greater relative weight in selecting a plant site than the location of raw materials.

In addition, the price of fuel gas seems headed upward as drilling and exploration costs mount. Many gas contracts cannot be renewed at prices established in contracts made just a few years ago. Federal control of the gas industry may tend to boost prices still higher.

In short, the spread between the cost of heat energy from coal and fuel gas promises to become less favorable to fuel gas. Eventually, the spread may even disappear.

Growth continues . . . The petrochemical industry has been characterized by growth, with the two billion pounds produced in 1940 being dwarfed by the 26 billion pounds produced last year. And the present rate of growth is expected to continue for some time, Groppe said.

In 1953 approximately 22 per cent of all chemicals produced were derived from petroleum and natural gas. Various authorities estimate that by 1960-65, petrochemicals will supply 50 per cent of our total chemical needs.

To date, the words petrochemical and Gulf Coast have been practically synonomous, with about 75 per cent of the petrochemical production located here. The big question is the extent to which the Gulf Coast will participate in the future growth of the petrochemical industry.

The Negative Side

Raw materials-fuel . . . The most important single factor in the rapid growth of the Gulf Coast petrochemical industry thus far has been the abundance of relatively cheap raw materials and fuel in the form of petroleum and natural gas hydrocarbons. At the same time, the most significant recent trend in this field has been the rapid increase in the price of natural gas, Groppe said.

Natural gas has many advantages as a fuel. This fact has resulted in the continuous high rate of expansion of long-distance transmission lines to the North and East. As a result of the competition for gas, new contracts provide for starting well-head prices as high as 20 cents per M.c.f. The impact of these prices already has been illustrated by the recent establishment of a large electrochemical operation in Central Texas based on power generation from lignite. The increase in the price of natural gas also will be reflected to some extent in the prices of ethane and other hydrocarbon raw materials recovered from this source.

Flexibility . . . One of the characteristics of the chemical industry is its high degree of flexibility, resulting in keen competition in raw materials, processes, and products. Groppe noted that only a few of the thousands of industrial chemicals cannot be made from alternate raw materials. In the case of the hydrocarbon chemicals, there is constant competition between natural products, coal, and petroleum raw materials.

In the petrochemical field, the raw-material flexibility and the resulting competition are reflected in several instances. The production of carbon black, where raw material cost is very significant, is being rapidly converted from natural gas to petroleum fractions. In ammonia manufacture, two plants are being built to use residual fuel oil, and it is reported that other new plants are designed for later conversion from natural gas to oil.

Another reflection of rising costs of light hydrocarbon raw materials is the increasing interest in heavier hydrocarbon raw materials for ethylene production. Allied Chemical & Dye Corp. recently began production of ethylene from residual fuel oil at its Towanda, N. Y., plant. Another factor

of long-range interest is the work being done in coal hydrogenation.

Rapid growth of the petroleum-refining industry near ultimate consumer markets and the increasing importance of foreign crude oil also enter the picture. On the East Coast, for instance, there was a 96 per cent increase in refining runs from 1943 to 1953. Since refinery gases constitute a prime petrochemical raw material, increased future attention will undoubtedly focus on growing refining centers such as this. With increasing importation of relatively cheap foreign crude oil, this location provides a combination of cheap raw-material cost and proximity to ultimate consumer markets, Groppe said.

Transportation . . . A major problem for Gulf Coast petrochemical producers has been transportation, since the major consumer product markets are in the Northeast. The cost of transporting raw materials must be compared with the cost of transporting finished products.

Two developments in the transportation of petrochemical raw materials will tend to retard growth in the Gulf Coast area since they provide lower cost raw materials nearer ultimate chemical markets. One is the growth of long-distance gas lines which afford the opportunity for large-scale processing for recovery of ethane and heavier hydrocarbons remaining in the gas at or near the market end of the pipeline.

The other development of importance is the increasing transportation of propane and butane in crude or products systems, which also would provide lower cost raw material near consuming centers.

Water . . . The problem of obtaining an adequate supply of good water is becoming increasingly severe, particularly in the lower gulf area and more highly industrialized sections. This problem is common to many other sections of the country. Annual rainfall in the Gulf Coast varies from about 50 in. in Louisiana to 15 in. in the Brownsville area.

Labor . . . An adequate supply of skilled labor has grown up with the expansion of the industry in this area. From a long-range viewpoint, however, the labor supply may be short since most of this industry is based on raw materials, supplying distant consumer markets which represent the major labor sources.

Decentralization . . . In a sense, the development of the Gulf Coast petrochemical industry was part of the trend on the part of many large corporations to decentralize expanding operations. Part was for defense production security reasons and part for purely economic reasons. However, a point of high regional concentration of the industry on the Gulf Coast has been reached and some decentralization from this area may be dictated from the standpoint of national defense.

The Positive Side

The outlook isn't necessarily black for the area, however, and Groppe pointed out some inherent advantages which should help avert a sharp trend.

Scale economics . . . An outstanding characteristic of the petrochemical industry is the use of large-scale, highly automatic, continuous processes. This factor has favored the installation of large-scale, raw-material-oriented petrochemical plants in the Gulf Coast from which all markets are served. This large-scale operation also permits use of low-cost water and pipeline transportation. Relatively cheap petrochemical sources, in turn, attract chemical manufacturers, and this economics of scale has been a very important factor in the high growth rate of the industry.

One of the outstanding examples of this trend is Gulf Oil Corp.'s ethylene-manufacturing operation. Manufacture on a very large scale, combined with pipeline transportation, provides a relatively inexpensive source of ethylene that has attracted a number of chemical manufacturers to this area. Other operations of this nature may provide further growth. On the other hand, the importance of economics of scale in stimulating Gulf Coast petrochemical industry will diminish to some extent as areal demands for given petrochemical products reach sufficient volume to justify plants in given market areas, Groppe predicted.

Integration . . . An important factor in

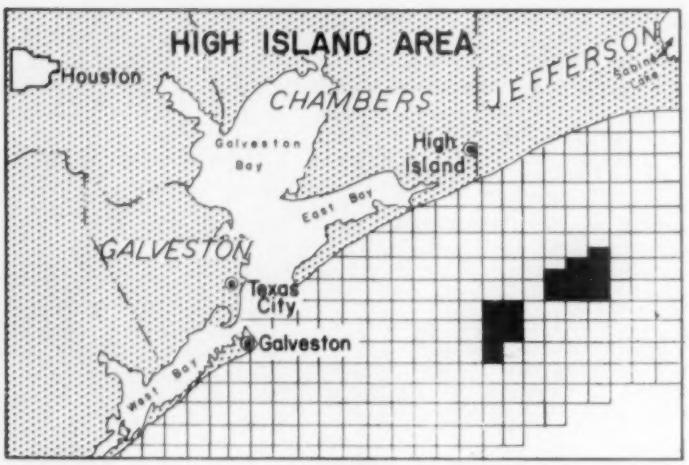
Expansion Nears Completion

LAKE CHARLES, La.—Cities Service Refining Corp., which built its 155,000-bbl. refinery here during World War II with an eye cocked toward defense requirements, is winding up a $22,000,000 expansion program.

The main feature of the expansion, which will enable Cities Service to make larger quantities of 115/145 avgas and jet fuel, is a 17,250-bbl. Hydroforming unit. Principal components of the unit are: A deethanizing absorber, a depentanizer unit, a splitter to remove the pre-avgas cut, and a 60-tray fractionator.

The company also added some major process equipment to older units in the refinery. Included in this program were: compression to raise absorber pressure from 75 to 200 psi., and a deethanizer at the gas plant; dual cyclones for the reactor and regenerator on each of the catalytic crackers; additional refrigeration, another debutanizer, retraying of the depropanizer, and additional condensing equipment at the alkylation unit.

The program is part of a $39,000,000 expansion being conducted by Cities Service at its refineries in East Chicago, Ind., and Ponca City, Okla., in addition to Lake Charles.



These Texas Shelf Tracts on Block

WASHINGTON.—With $129 millions already in the cash register from the sale of leases off Louisiana, the Department of Interior will try again next week when it offers 38 tracts on the Continental Shelf off Texas for leasing.

It has been generally conceded that the industry regards prospects off Texas with considerably less enthusiasm than it does Louisiana's offshore area. Texas has seen much less activity and has only one discovery compared to 23 off Louisiana. But, the spirited bidding in the Louisiana sale surprised even the most optimistic Interior officials. There could be a few surprises when the Texas bids are opened.

The Texas portion of the Continental Shelf lies in water that is generally deeper than the Louisiana area, but the 38 tracts to be leased next week are in water which ranges from 40 to 100 ft. This is about the same depth range involved in the tracts leased off Louisiana last month.

The Government is offering leases on a total of 111,789 acres. The 38 tracts are all located well past the 10½-league limit from shore and are all located in two general areas. Six full blocks of 5,583 to 5,760 acres each are off the Mustang Island area in water from 70 to 110 ft. Two full 5,760-acre blocks and one half-block of 2,880 acres are in the Matagordo Island area in water of the same depth. The remaining tracts are all in the High Island area, nearer Louisiana, and are in water from 40 to 60 ft. deep.

The only commercial production yet established off Texas is from two wells drilled by Standard Oil Co. of Texas from the same platform 1½ miles off Padre Island *(The Oil and Gas Journal, October 18, page 82)*.

It was in the same general area, but farther at sea, that Gulf Oil Corp. a few weeks ago abandoned as dry its first test of a $3 million block off Mustang Island. Both these locations are on state owned lands and more than 20 miles from the tracts to be sold by the Government next week.

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future growth in this area is further integration of existing manufacturing operations. Most of the petrochemical growth has been in basic chemicals. As the industry matures there will be increasing local vertical integration or upgrading of these basic materials to products of higher value. The existing operations provide a broad, firm foundation for this growth.

Self-generation . . . The tremendous expansion in the Southwest has created favorable psychological conditions stimulating investment in the area. Public facilities have been developed to meet the demands of a rapidly growing population. The increases in population accompanying industry growth stimulates further growth. These self-generating characteristics will undoubtedly stimulate additional growth of the area's petrochemical industry.

Water transportation . . . The most important development in the transportation of petrochemical products is the increasing movement of these materials to markets by barge and tanker. The transportation of chemicals by water from producing plants on the Gulf Coast to strategic points nearer market areas for storage, handling, and distribution has in many cases been cheaper than direct transportation by rail or truck.

Deep Gulf Test Cased

HOUSTON.—Humble Oil & Refining Co. has set 5 1/5 in. casing at 15,000 ft. at an offshore wildcat in the Gulf of Mexico near St. Joseph Island, South Texas.

This is the deepest hole yet drilled in the Texas tidelands. Production tests are expected to take several weeks.

This is Humble's first South Texas wildcat in the tidelands since the Submerged Lands Act was passed. Most of its offshore activity has been centered off Grand Isle, La.

According to an earlier announcement, the South Texas test was scheduled only to the 13,000-ft. mark. Another Texas wildcat is slated to be drilled nearby later this year.

CATC Test in Gulf Hits

NEW ORLEANS.—The CATC group has a distillate discovery at its first test of a 38,000-acre lease block 17 miles off the coast of Cameron Parish.

Continental Oil Co., operator for Atlantic Refining Co., Tide Water Associated Oil Co., and Cities Service Co., said the well had an initial potential of 3,450 M.c.f. of gas and 52.5 bbl. of distillate daily on a ¼-in. choke from perforations of the 8,066-80-ft. interval in Miocene sands. Tubing pressure was 3,200 psi.

Nearest production is about 10 miles east of the wildcat.

Proration Drive Gaining

Stricter conservation urged in Rocky Mountain states; early action expected in Idaho, Nebraska, and Wyoming

Ted A. Armstrong

DENVER.—The coming year may be the most important in the Rocky Mountains in the field of conservation.

When the legislatures of Idaho, Nebraska, and Wyoming convene soon, bills probably will be introduced calling for conservation laws with provisions for market-demand proration.

Montana and Colorado will be skipped for the present, Montana because market-demand proration is not considered necessary there yet and Colorado because opposition now is strong and proponents want to wait for a court decision in the Rangely field case. The power of the present conservation commission will be tested by the case.

The strong drive for stricter conservation laws was evident in the addresses and corridor conversation at the ninth annual convention here October 21-23 of the Rocky Mountain Oil and Gas Association.

Both principal speakers, R. O. Dietler, chairman of Stanolind Oil Purchasing Co., and Jack Woodward, president of Texas Independent Producers and Royalty Owners Association, told the association the time has come when Rocky Mountain producers must adopt market-demand proration.

The reasons: to protect their own marginal producers; to prevent a crude-oil price break; to carry their share of excess producing capacity required by national defense; to prevent waste and extend the life of their producing wells.

Opposition to proration is still widespread in the area, but the association used the meeting to further sell many opponents on the need for new legislation.

The opposition takes various forms.

. . . Some point to drilling costs, higher than in Texas, and say more production is justified.

. . . Some feel that the Rockies, in view of the big investment in exploration, should be able to produce with more freedom than older oil states for several years—as did the older states before they adopted conservation laws.

. . . Some are afraid that strict proration will harm the marginal operator with stripper wells.

Texas threat . . . Strongest language at the meeting was used by Woodward, who told the producers that Texas will quit "holding the umbrella" during the present storm of oversupply if it doesn't get more cooperation.

"Texas has attempted—and successfully so far—to carry virtually the entire load," Woodward said. "The result is that we are producing today in Texas on a 15-day month . . . In Texas we are hurting. And, believe me, if we can, we intend to do something about it."

The visiting independent told the association that all states have a stake in maintaining a stabilized industry.

"A price cut would hurt an oil producer here as much as one in Texas, and the quickest way to end your boom would be to refuse to take some action when your failure to do so may precipitate a price cut."

Woodward assured the small operators such an action would help them. Texas found, he said, that the principal beneficiary of proration is the marginal producer. "If we didn't have a proration system, we would have a feast and famine industry in which the marginal well simply could not exist. With no restriction on flush production, marginal wells would have no market," he declared.

He blamed the present oversupply on imports, and tagged this as the other of two major problems on which the rest of the nation needs help from the Rocky Mountains. "Just as Texas alone cannot carry the entire reserve capacity for America, neither can Texas alone, or any other isolated area, carry the battle to Congress," he said.

Dietler's approach . . . The Stanolind Oil Purchasing chairman blamed today's oversupply on the fact that demand hasn't increased this year as it was expected, but he joined Woodward in advocating closer regulation of Rocky Mountain production.

Producing and refining capacity now total 8,200,000 bbl. a day, compared with a domestic demand of about 6,400,000, Dietler said, indicating a reserve producing capacity of 1,800,000 bbl. daily.

Excess capacity in refining is less, about 1,200,000 bbl. daily, because refiners are processing about 600,000 bbl. daily of imported crude, he added.

Restrictions on production have come chiefly in Texas, Louisiana, Oklahoma, and Kansas, Dietler said. "The financial burden of the excess capacity is falling largely on them, and they and a good many other industry observers are beginning to think that the burden should be shared more equitably."

"The time has come," he continued, "when these states out here should adopt market-demand legislation for your individual benefit and for that of the industry and the national-defense effort."

Right now, it looks as if mid 1955 may see a considerable step in this direction.

OLD AND NEW presidents of the Rocky Mountain Oil and Gas Association. H. H. Healy, Casper, retired division manager of Ohio Oil Co., accepts congratulations of outgoing W. W. Flenniken, (right) Denver independent. For a picture of other new officers, see page 153.

Key Gas Strike Made

Gulf-Phillips discovery opens Delaware basin's third area of pre-Permian production; test may spark deep drilling

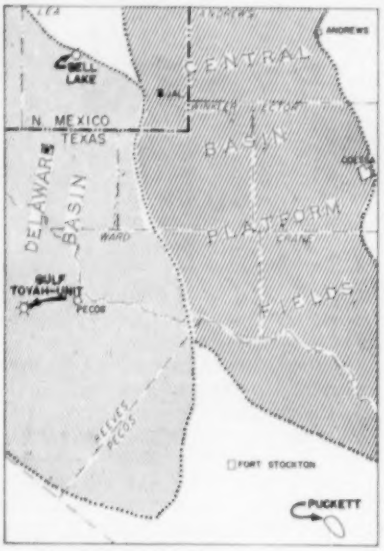
ODESSA.—A 65,000,000 cu. ft. gas well completed last week—medium-size as good gassers go—was welcome news for operators here.

It is the third location where pre-Permian production has been found in commercial quantities in the extensive geologic province known as the Delaware basin of West Texas and southeastern New Mexico. The accompanying map shows this basin in relation to Central Basin Platform fields in West Texas.

Fuel to fire further exploration drilling below the deep Permian beds was supplied by Gulf Oil Corp. and Phillips Petroleum Co. 1 Shurtleff, (1 Toyah Unit), located 12 miles west of Pecos in Reeves County.

Drilling proved the well to be in a relatively shallow portion of the basin, as operators reported sample top on the Ellenburger at 14,713 ft., minus datum point of 11,889 ft. Total depth was 15,038 ft., where the drill was still in Ellenburger dolomite.

Tests in the Ellenburger developed gas flows up to 5,000 M.c.f. per day, after which the well was plugged back to 12,875 ft. Final perforations, identified as being in the Silurian, were at 12,570-12,610 and 12,690-12,795 ft. Tests covering those intervals flowed at the daily rate of 15,800 M.c.f. on 33/64-in. choke, under pressure of 2,300 psi., and 20,000 M.c.f. on ¼-in. choke. Final potential after fracture treatment was a calculated 65,000 M.c.f., through open tubing.



Why it's important . . . Importance of the discovery is mainly in its geologic location. The only commercial pre-Permian production in the Delaware basin at this time is in Puckett field, in Pecos County. This field is shown by some geologic maps as being in the Sheffield channel. The channel is considered a link between the Delaware and Midland basins. Other opinions hold that its pre-Permian formations—production at Puckett is mainly from the Ellenburger—should rightly be placed within the Delaware basin limits.

The other area within the Delaware basin showing commercial production is in Lea County, New Mexico, where Continental Oil Co. is drilling its Bell Lake tests. The original well was drilled into high-pressure gas and subsequently was lost due to blowouts and fire, but a twin well is near the expected pay at 12,546 ft. A long, north stepout is currently flowing gas and distillate from around 12,617-12,657 ft. Field sources have identified that sections as Wolfcamp, while the first well was thought to be in the Pennsylvanian.

The extent of future deep drilling in the Delaware basin may be determined by further testing of the Gulf-Phillips strike and the outcome of the Bell Lake tests.

Firms Ask for Rehearing

AUSTIN.—Ten Texas oil companies charged with violating Texas antitrust laws in raising wholesale prices of gasoline uniformly in 1946 and 1947 last week petitioned the Texas Supreme Court for a rehearing of the charges.

The companies argued in their petition that uniform lifting of prices is not valid evidence of collusion or conspiracy. If it were, the petition said, sellers of goods throughout the state and country would be convicted simply because of a system of merchandising universally and continuously practiced for hundreds of years.

Defendant companies are Arkansas Fuel Oil Corp., Humble Oil & Refining Co., Phillips Petroleum Co., Standard Oil Co. of Texas, Gulf Oil Corp., Cities Service Oil Co., Continental Oil Co., Magnolia Petroleum Co., Sinclair Refining Co., and The Texas Co.

Pilot Flood Set

Humble to try conventional project in Spraberry field

AUSTIN.—The Texas Railroad Commission last week gave its official blessing to Humble Oil & Refining Co.'s proposed effort to increase oil recovery from the tight Spraberry sand of West Texas.

Humble was granted a 1-year permit to prove in the field its laboratory-tested theory that a conventional water flood can be made to work in the Spraberry *(The Oil and Gas Journal, October 4, 1954, page 118).*

The key to the success of the program, according to Humble engineers, is whether the frequency and width of Spraberry fractures are favorable.

The test will be carried out with a pilot five-spot flood in the Spraberry pay at 7,200 ft. under Humble's 1,320-acre L. H. Shackelford "B" lease, Spraberry Trend Area field. About 1,500 bbl. of water per well per day will be injected through the four input wells at a pressure of 500 psi.

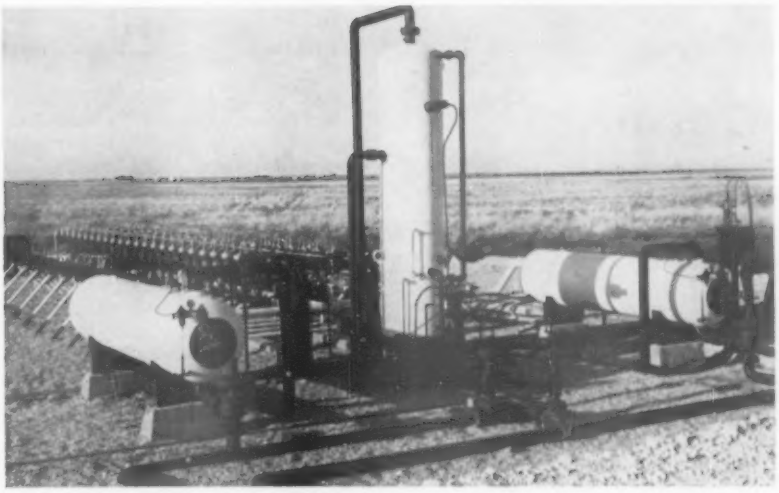
The commisison designated the entire lease as an experimental waterflood area not subject to gas-oil ratio restrictions for 1 year from October 4. Water-flood allowables, the commission said, will be assigned when the project is under way, but none will exceed the regular Spraberry allowable.

Lab work . . . Humble's theory that a conventional flood will work is contrary to previous conviction of the industry generally.

It is based on laboratory tests performed with an electronic analog computer and an artificially fractured core.

The company's earlier work involved substituting certain properties of an electrical system to represent flow of fluids through the formation. Results indicated that water injected into a fractured formation would displace appreciable oil from the matrix, the amount depending on the ratio of matrix permeability to fracture permeability.

Going further with a miniature flood of the fractured and rebuilt core, Humble found that oil could not only be flooded out of the matrix but that practically no channeling of water occurred.



ADJUSTMENT OF CHOKES on the flow manifold (left) is the only manual labor involved in Shell Oil Co.'s automatic tank battery program.

Shell has 12 leases on . . .

. . . Push-Button Production

Ed McGhee

DENVER CITY, Tex.—In West Texas' Wasson field, Shell Oil Co. has 12 leases equipped for automatic operation from well head to pipeline.

In addition, Shell has 10 leases being outfitted and 7 more scheduled for automatic operations for 1955.

It has been estimated the savings and increased revenue resulting from the centralized automatic leases will amount to several million dollars during the life of Wasson field.

The normally manual operations performed automatically on the Shell leases are:

. . . **Controlling each well** to produce its exact allowable.

. . . **Shutting in the well** if there is breakage or stoppage in the lead line or tank battery.

. . . **Routing the oil flow** through separators and treaters if needed, then to storage. Tanks are switched when full.

. . . **Metering out production** by a weighing tank.

. . . **Measuring and recording** gravity, temperature, and b.s. and w. The oil is automatically recirculated if not of pipeline quality.

. . . **Recirculating tank bottoms** after each fill-empty cycle.

. . . **Testing each well** monthly or more often. "Running" records of oil, gas, and water production are made on strip charts.

Pilot tests of the automatic equipment started on Shell's Baumgart "D" lease in 1951. When the experimental installation proved practical, the first actual automatic lease operation was set up in 1953 on the Baumgart "B" lease. Of the 12 automatic leases now existing, 9 have been completed since April. Wasson field was selected for the project because its existing tanks had been scheduled for replacement within the next 5 years.

At the present time, pipeline companies do not accept automatic measurements, but various groups are attempting to set up a codification system of basic requirements for the transfer of oil from tank to pipeline. It is hoped that the pipeline companies will then accept production from the automatic batteries without the necessity of manually checking the tank measurements and tests for water, gravity, and temperature.

Cycling Ordered

La Gloria decision may test FPC power to control gas

AUSTIN.—Operators in multipay La Gloria field last week were given the go-ahead to expand cycling operations to take in several more formations.

The action, taken by the Texas Railroad Commission, might precipitate the first federal-state clash over authority as a result of the controversial U. S. Supreme Court ruling in the Phillips case.

The extension of the program to other pays plus the abandonment of cycling in certain formations where it has reached economic limits was sought by Magnolia Petroleum Co. and La Gloria Oil & Gas Co. at a hearing in mid-October *(The Oil and Gas Journal, October 18, page 81)*.

A Magnolia spokesman told the commission at the hearing that the cycling operation, if continued and extended where feasible, would result in the recovery of an additional 5,600,000 bbl. of liquids.

The Railroad Commission approved Magnolia's suggestion that cycling should be terminated in the Stolze, Culpepper, Brooks, and North Bauman gas-producing zones. It ordered that cycling should be initiated or continued in the South Bauman, Arguellez, Conkle, Hornsby "A", Hornsby "C", Scott, North Corcoran, South Corcoran, North Falfurrias, South Falfurrias, South Loma Blanca, Hammond, Atlee "A", "B", "C", and "E", and South Atlee "C" zones.

La Gloria field, in Jim Wells and Brooks counties, boasts 35 gas-producing zones in the Frio and Vicksburg transition zone from 5,100 to 8,000 ft. Cycling was initiated in the field in May 1941 and carried on continuously since.

State-federal conflict? . . . The Railroad Commission's decision that expansion of the cycling program is necessary to prevent waste in the field will have the effect of further cutting into deliveries of residue gas to Texas-Illinois Natural Gas Pipe Line Co.

Texas-Illinois, which says it has a contract which calls for purchase of 85,000,000 cu. ft. of gas daily from the field, protested at the October hearing that previous cycling had already reduced its take to 35,000,000 cu. ft. daily.

The pipeline firm said it had had to replace this lost gas with supplies obtained under short-term contracts at about twice the price. It argued that Magnolia had failed to show what effect expansion of cycling would have on its La Gloria supply and urged that the commission postpone its decision until Texas-Illinois could study the data and prepare its case.

Gasoline Plant Operating

MIDLAND, Tex.—El Paso Natural Gas Co.'s new natural-gasoline plant 40 miles north of Big Lake, Tex., in the Midkiff area of Spraberry Trend fields has been placed on stream.

The new plant has a gas-processing capacity of about 167,000,000 cu. ft. daily. Production is scheduled to reach 150,000 gal. of butane, 45,000 gal. of natural gasoline, and 200,000 gal. of propane a day. Products are taken through 27-mile, 10 and 6-in. line to Santa Fe Railway's Benedum spur. Residue gas is taken by El Paso into its own lines for transportation to New Mexico, Arizona, and California.

Proration Condemned

Union's Taylor soundly criticizes any attempt to impose market-demand statute or compulsory unitization in state

D. H. Stormont

BAKERSFIELD.—There is no need for state legislation to obtain true conservation in California oil fields, Reese Taylor, president of Union Oil Co., told members of the San Joaquin Valley Oil Producers Association here October 28.

True conservation already is being effected voluntarily through the Conservation Committee he declared. Any "so-called conservation laws" in which the factor of market demand plays a large part, and any form of compulsory unitization, he regarded as measures to be fought rather than sought.

"There are far more operators facing financial ruin right now under the so-called benevolent protection of the conservation laws of Texas, Louisiana, Oklahoma, and other states, where production during the past 18 months has been cut from 40 to 50 per cent, than at any time during the twenties and thirties in California," he declared.

"Texas and Louisiana," he continued, "are still states with large surplus productivity, which California does not have. Also, in both cases the laws are designed to control production by limiting output to market demand, with conservation as an incidental rather than a primary consideration.

"I would also point out that as a result of such laws, production in many states has been curtailed by as much as 50 per cent of M.E.R., largely to make room for foreign imports. In other words, American producers having no interest in foreign fields are being forced by their own so-called 'conservation laws' to subsidize, without compensation, foreign imports."

Forced units opposed . . . He also took issue with the need for the "rule of capture" being outlawed in California, as was recommended by Richfield Oil Corp.'s president, Charles Jones, in his pro-conservation address before the group last spring.

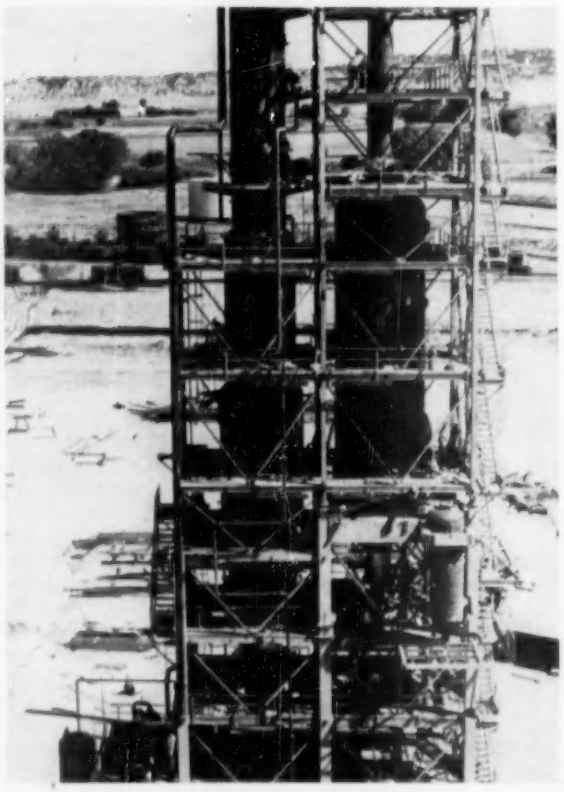
Richfield currently is carrying out a statewide educational campaign, toward some sort of conservation bill in the next legislature.

Taylor likewise argued against compulsory unitization, under which an "administrative body would conduct hearings and make rulings binding on all property owners in a proposed unit:" first, because he did not want to see more business placed in the hands of political bodies: and second, he is convinced it is unnecessary, "when we have proven by so many successful results that we can accomplish the same ends better by voluntary means."

"The small producer, the little independent, is often pictured as the villain in the dealings, but from experience in a considerable number of units or cooperative agreements now working, or in the process of formation, in our state, I must say that the large operator often offers a far greater problem.

"Even the price paid to the occasional holdout, who is only interested in his nuisance value, has never been so high as to justify sticking our necks forever into the noose of state control of our production. We have done a good job in California without state control."

First Fluid Coker Nears Completion



This is the first construction picture released of Carter Oil Co.'s new fluid coker at the Billings, Mont., refinery. The 3,000-bbl. per day unit is scheduled to go on stream during the fourth quarter. It is the world's first fluid coker of commercial size. The fluid-coking process was introduced by Standard Oil Development Co. Extensive experiments at a 100-bbl. pilot plant at the Esso Laboratories in Baton Rouge preceded plans for commercial use of the process. Coking will be used to convert heavy residues from vacuum and other operations to middle and light distillates. The new process is said to have several advantages over conventional delayed coking. Esso Standard Oil Co. has announced plans for construction of a 10,000-bbl. fluid coker at Baltimore and a 20,000-bbl. unit at Baton Rouge. Other companies also are planning to use the new process.

Offshore Speedup?

Long Beach concerned over strike by Monterey Oil Co.

LONG BEACH.—Monterey Oil Co.'s offshore-island discovery may prod the Long Beach City Council into early development of the city's nearby submerged lands.

Monterey last month completed its first well from the 75-ft. diameter drilling island it erected 1½ miles offshore from Seal Beach. It was completed for 300 bbl. of 26°-gravity crude at 5,906-6,280 ft., reportedly in a zone equivalent to the Ford pay of Wilmington field.

The island is about 2,000 ft. from the eastern boundary of the city's State Park lease. As the discovery is shut in pending completion of a pipeline to shore, drainage is not occurring. However, since several slant holes could be drilled from the structure, the council is giving the situation considerable thought.

Ownership question . . . One complica-

California's governor finds . . .

. . . Industry Touchy About Smog

LOS ANGELES.—Tired of the pointing finger of accusation, the California refining industry reacted swiftly and with a vengeance when Gov. Goodwin Knight asked refiners to shut down to see what effect it would have on the most prolonged siege of smog to date.

With one eye firmly on Tuesday's ballot boxes, Knight asked the eight major refiners and 15 smaller companies operating in Los Angeles County to shut down more than 770,000 bbl. daily in refining capacity. He said the test would determine how much refineries contribute to the eye-smarting, throat-burning smog.

The reply of the refiners was immediate and emphatic. In rapidfire order, heads of the major companies told the governor his plan was unsound, impractical, and "at best" would be meaningless. Reese Taylor, president of Union Oil Co., which operates a 122,000-bbl. daily refinery here, reminded the governor pointedly, "the solution to the smog problem is not to be found in politics."

All industry spokesmen said Knight's questions were answered in 1948 when Los Angeles experienced a severe smog condition at a time when all its refineries except one were shut down by a strike. They pointed to $23 million spent by refiners for control devices to eliminate escaping hydrocarbon vapors at refineries. S. F. Bowlby, Shell Oil Co.'s vice president, said he thinks the oil industry has gone about as far as it can go and suggested it's time for "other segments of the public" which contribute to the smog problem to meet the efforts already made by refiners.

R. L. Minckler, president of General Petroleum Corp., said a refinery shutdown might ruin all the work done to date in convincing civic officials and the public that refiners aren't the bad boys after all. He said if atmospheric and meteorological conditions changed during a shutdown and the smog lifted the public would be absolutely convinced refineries are causing it all.

Minckler guessed the weather perfectly. Strong winds swept out of the Los Angeles basin last week, breaking up the inversion layer that had kept the Los Angeles air grimy for 18 straight days. Weather officials promised at least temporary relief.

Unmollified by the emphatically negative reaction to his suggestion, Knight said last week he still thinks a solution to the problem will require a refinery shutdown for an "adequate test period." He added he is allocating $100,000 in state funds to study the health aspects of smog.

tion is whether Long Beach or the state holds title to minerals lying offshore from the strip of beach half a mile long. The city was granted title in 1918 along with that to the other submerged lands within the extensions of its city limits seaward 3 miles.

In 1932, however, Long Beach quitclaimed the beach back to the state—but for the purposes of park, recreation, and playgrounds only. City officials, therefore, claim that mineral rights to the strip and to the 850 acres of adjoining submerged lands were not conveyed with the title.

At a recent meeting, Councilman R. C. Kealer urged that development plans for this portion be prepared. City Manager S. E. Vickers suggested a possible compromise be worked out with the state so that development can progress.

E. R. Stanley, of Stanley & Stoltz, consultants to the city, proposed dividing the city's offshore property into several parcels for development.

The eastern third of the undrilled property should get first attention, he emphasized. Any drilling structure required could be placed outside the disputed area and development carried on through slant drilling.

Before any unitization agreement can be entered into with Monterey, so that a pressure-maintenance program to offset subsidence might be carried out, amendment of the state public resources code will be necessary, Kealer declared.

Santa Cruz Test Planned

LOS ANGELES. — Richfield Oil Corp. shortly will start a test on Santa Cruz island, 22 miles offshore from Santa Barbara.

The company has obtained a 54,000-acre lease on the 22-mile long, privately-owned island, all of which is under lease expect some 7,000 acres on the eastern end.

The company is continuing its geological work. After location for the initial well is selected a 10,000-ft. rig will be moved in. Drilling is to start before the end of the year.

The Richfield test will be the first ever drilled on Santa Cruz, easternmost of three channel islands. During the past 25 years, seven or eight wells were drilled on Santa Rosa, all unsuccessful although some had oil showings. Most recent drilling was in late 1948 and 1949, when Signal Oil & Gas Co. drilled three dry holes. No tests have been made on San Miguel, smallest and westernmost of the three.

CANADA

Texaco Tops Alberta Sale

EDMONTON, Alta.—Texaco Exploration Co. paid the top price of $1,353,000 for a half section in the Sturgeon Lake field when Alberta held its third major lease sale this year and increased its 1954 income from leases to about $60 million.

Texaco paid $1,153,000 for another quarter section also in Sturgeon Lake about 200 miles northwest of here. Socony-Vacuum Oil Co. paid $1,250,-111 for an 81,784-acre parcel in the Alhambra provincial reserve 90 miles southwest of Edmonton.

Major bidder for leases in the mushrooming Pembina region was Socony-Vacuum, discoverer of the field. Leases were sold on 3,251 acres in the Pembina area and Socony-Vacuum paid $1,136,000 for 980 acres.

Petrochemical Plant Sold

MONTREAL. — Union Carbide Canada, Ltd., has announced purchase of the Montreal East petrochemical plant built 3 years ago by Dominion Tar & Chemical Co., Ltd.

The plant, costing Dominion an estimated $12 million, recovers ethane and ethylene from local refineries and produces ethylene oxide, ethylene glycol, diethylene Glycol, and synthetic detergents.

Carbide will convert the plant to its own oxidation process and will add facilities for production of polyethylene, according to Ewart Greig, president. This purchase marks the first entry into petrochemicals of Union Carbide & Carbon Chemical Co.'s Canadian affiliate.

Tanner to Speak

REGINA.—N. E. Tanner, president of Trans-Canada Pipe Lines, Ltd., will be principal speaker at the annual meeting here November 25 of the Saskatchewan Division of the Canadian Petroleum Association. Officers will be elected during the afternoon business session.

There's Little Harmony on . . .

. . . How to Handle Fuels

WASHINGTON. — There are two sides to every question except that of our future fuels policy, on which there are four.

And all four were strongly argued in briefs filed with the Cabinet Committee on Energy Supplies and Resources Policy as it entered on the last lap of the study on which it is to report to President Eisenhower by December 1.

Domestic oil producers, importing companies, the natural-gas industry, and the coal operators have presented their recommendations on the steps to be taken to encourage proper development of our natural resources. Each group had recommendations running counter to those of the other three except on one point—the release of the natural-gas industry from Federal Power Commission regulation.

On the question of FPC regulation the domestic producers, coal operators and natural-gas industry were agreed. But while the oil producers and natural-gas operators and pipelines saw freedom from government control necessary to the ordered future expansion of their industries, the coal group foresaw it would lead to a gradual increase in gas prices which would improve the competitive position of coal.

While the coal industry disfavored government control of production, it strongly urged government control of the use of gas to block out large markets which coal seeks to recover.

Imports . . . On the question of oil imports, the coal operators joined domestic producers in urging restrictions. But the oil groups asked only that imports be confined to the volume necessary to make good the industry's policy that imports should supplement but not supplant domestic oil. Coal asked the return to the quota system of the Venezuela trade agreement and even sharper restrictions, if possible, on imports of residual fuel oil.

The importing companies asked that no restrictions be imposed on imports. They argued they can control imports to avoid injury to domestic production.

Other issues . . . There were a number of points on which recommendations were made, mostly noncontroversial with the exception of imports of natural gas. The coal industry urged a ban and the domestic oil and natural-gas industries opposed restrictions other than FPC requirements.

The Independent Petroleum Association of America strongly urged retention of the present percentage depletion allowance.

The National Petroleum Association supported dispersal of petroleum refining capacity in line with the policy of the Office of Defense Mobilization to minimize loss in the event of air attack.

The Independent Refiners Association of America recommended steps to retain independent refiners' facilities, which it pointed out are vitally needed in wartime but in peace are subjected to a squeeze as the integrated oil companies fight for position.

The coal industry urged adjustment of alleged unfairness in freight rates. The coal industry also asked mandatory use of coal as fuel in government facilities and in the plants of government contractors and others receiving government assistance.

New Expansion Due

Defense will ask industry for more refining capacity

WASHINGTON.—The oil industry will be asked next spring to undertake another program of expansion in refining facilities.

Defense officials and the Military Petroleum Advisory Board are taking a fresh look at future requirements and they may lay a new 3 to 5-year expansion program before the Office of Defense Mobilization. The program may call for a boost of as much as 600,000 bbl. daily in basic refining capacity.

The Government's present target for refining expansion is 8,750,000 bbl. daily by the end of 1955. Projects planned, both with and without tax amortization, are close to that figure, but just how much gap exists between figures on paper and construction that will actually be completed is unknown. This is a part of the current MPAB study.

Alkylate problem . . . Official quarters are not concerned about crude production or lubricating oil, but alkylate remains a major problem. Alkylation expansion is far short of the program goal and has been hampered by too many uncertainties in military demand for aviation gasoline. Some of this uncertainty is caused by question marks in defense department appropriations from year to year.

Brig. Gen. W. W. White told the National Petroleum Council last month the peak demand in military avgas will come next year at 124,000 bbl. daily. This compares with 118,000 bbl. daily this year and is expected to taper off to 100,000 bbl. daily in 1960.

Except for a relatively small volume of lower octane avgas, demand is currently split evenly between 100/130 and 115/145 grades. Future demand, however, will call for increasing volumes of 115/145. This will increase alkylate requirements.

The MPAB study will be completed early next year. At the same time ODM may have reached a decision on the long-standing question of a defense oil pipeline from the Midwest to the Atlantic Coast. Some way to meet an anticipated military need of an additional 1,000,000 bbl. daily on the Eastern Seaboard has been under study for months. The major question has been whether a line should be built in anticipation of the future need or the pipe and equipment fabricated and stockpiled for future construction.

Gas-Pipeline Costs Jump

WASHINGTON.—Natural-gas pipeline operating costs are increasing at a faster rate than operating revenues, it was indicated last week by the Federal Power Commission.

Over the 12-month period ended last August, commission statistics disclosed, the operating expenses of the 36 pipelines filing with it increased 18 per cent over 1953 while operating revenues increased only 15.5 per cent.

The biggest cost increases were 17.7 per cent for purchase of gas, the major item of expense; 15.3 per cent in distribution expenses, and 14.1 per cent in transmission expenses.

Tanker Trade-In Negotiated

WASHINGTON. — The first deal made under tanker trade-in legislation passed by Congress this summer will give Esso Shipping Co. $5 million credit on two new supertankers—and private shipbuilding industry a $22 million shot in the arm.

The Maritime Commission and Esso

have agreed on terms of the trade-in of five war-built T-2 tankers for the credit. Esso will spend about $17 million more of its own money for two 35,550-ton, 16.3-knot supertankers.

Mergers Studied

Chemical industry among those being scrutinized

WASHINGTON.—A fast but comprehensive investigation of corporate mergers and acquisitions was ordered last week by the Federal Trade Commission.

The order followed a report that more than 2,600 mergers have been consummated in the past 3½ years, 822 of them in 1952 for the greatest total since 1929. Last year was a close second with 793. In the first half of this year there were 295 mergers, considerably fewer than in the corresponding 1953 period but substantially above the average since 1931.

Through its investigation, the commission hopes to uncover the pattern of post-Korean mergers and determine how many were intended to increase product diversification, to lessen competition, to expand small or medium-sized firms so they could compete more effectively with entrenched large companies, to integrate operations, or to reorganize firms which had failed financially.

From this information the FTC hopes to spotlight the effect of mergers on competition, and determine if and where the Government should enforce the Clayton Act prohibitions against mergers that tend to lessen competition or encourage monopoly.

Both the FTC and the Department of Justice are watching the merger situation closely, but neither agency has indicated that it is studying any consolidations in the oil industry. The commission disclosed it now has 209 mergers under consideration, with chemicals one of the industries in which the greatest number occurred.

Tanker Bids Expected

WASHINGTON.—The Maritime Administration will open bids November 15 for four new tankers for the Military Sea Transportation Service — or how many it can buy for the money it has to spend.

The number of vessels ordered will depend on just how kindly bidders treat the $30,000,000 appropriated by Congress in the last session. The MSTS planned to build five tankers at a cost of $37,500,000, but Congress cut the appropriation by $7,500,000.

WATCHING WASHINGTON

Bertram F. Linz

Energy Studies Begin

The Cabinet Committee on Energy Supplies and Resources Policy has received statements and recommendations from a large number of oil, natural gas, coal, and other organizations and is now settling down to a study of the material.

The committee has 1 month in which to digest all the data laid before it and to prepare its report for President Eisenhower.

There is little information that the group, headed by J. Ed Warren, does not already have. However, the reasoning and recommendations made by each organization will receive careful study. The committee's decision will be watched carefully to see whether it follows the Eisenhower administration's policy of unhampered international trade, or whether it urges higher import taxes and other restrictions on the importing of oil.

Whatever the committee recommends, it is going to make as many enemies as friends. How to encourage the development of our several energy sources without handicapping any one of them is a problem industry, Congress, and government agencies have been struggling with for some years, and there is no reason to believe the committee will come up with a universally satisfactory solution where others failed. But if the committee does the job expected of it, it will provide a basis for further consideration, legislative and other, out of which eventually some acceptable program may be developed.

Atomic Energy In 20 Years

Lewis L. Strauss, chairman of the Atomic Energy Commission, predicts that production of electricity from atomic energy may change American industry within 20 years.

However, atomic energy will not solve all the problems of competitive industrial production, Strauss warned. Areas such as New England, where power is expensive, and areas where labor, water, and markets are available, will benefit the most.

Although nuclear power is just around the corner, it has not yet been decided how it can be produced most economically. There are several diverse types of reactors for the development of electrical energy, and the commission plans to test five of them, completing one each year over a 5-year period. The first is under construction in Pennsylvania.

It is significant that AEC officials and experts in what may become our next new great industry are talking of atomic energy only in terms of electric power at this time. Little is heard now of the predictions of a few years ago of atomic-power automobiles, home heating, and other common uses for which the atom probably will not be developed in our generation.

Jet Fuel Demand Rising

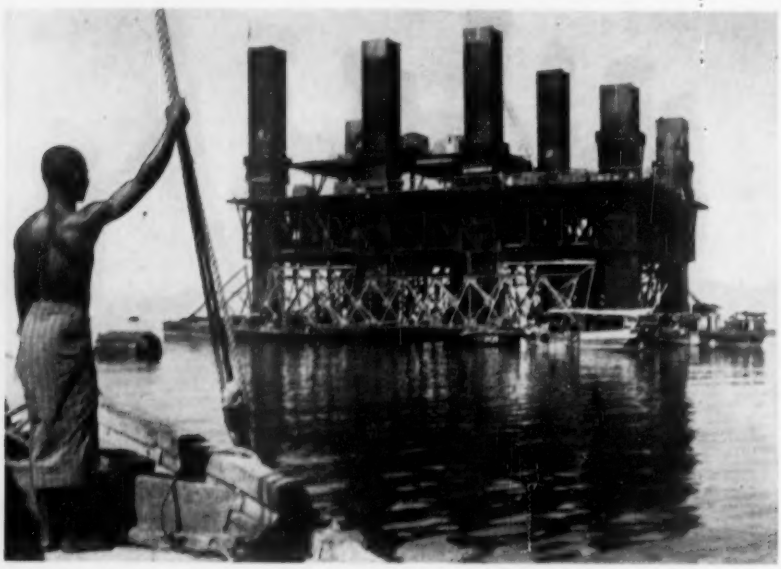
The Air Force will treble its demand for jet fuel by 1960 while its requirements for aviation gasoline will decline after reaching a peak in 1955.

Projections of demand for aviation fuels indicate it will be many years before aviation gasoline passes out of the picture. The conventional airplane engine will continue to be the workhorse of air transport, because it is more economical for certain types of transportation, particularly freight.

Military build-up is the basis for estimates of dramatic increases in jet fuel demand. Early this year, the military estimated demand would double in 5 years. Now they have upped their estimate as the Air Force continues to expand.

The latest estimates, made known to the National Petroleum Council last month, are that demand this year will be 117,000 bbl. daily. Next year it will be 184,000 bbl. daily, 210,000 bbl. in 1956, and 283,000 in 1957 when the presently authorized strength of the Air Force will be 137 wings. Thereafter, the increases will be more modest, but the expectation now is that demand will reach 324,000 bbl. daily by 1960. And unless the international race for military supremacy slows down, actual requirements probably will top that figure substantially.

Meanwhile, aviation gasoline demand will show a slow increase. Our military demand, estimated at 118,000 bbl. daily this year, will reach its peak in 1955 at 124,000 bbl. and then drop to 100,000 bbl. in 1960.



Persian Gulf Test Near

Shell to spud wildcat off east coast of Qatar about first of year; platform moved to site in about 30 ft. of water

THE second marine effort in the Persian Gulf is about to be undertaken by Shell off the east coast of the Shaikhdom of Qatar.

The company has moved a 1,200-ton platform mounted on pontoon barges to a location 35 miles north of the Qatar capital of Doha and some 5 miles from shore. An Ideal 50 rig capable of depths in the 7,000-8,000 ft. range will be used for the test, to be known as Matbakh 1.

The test, which will be made in water about 30 ft. deep, will be spudded around the end of the year.

Shell obtained the Qatar offshore concession in 1952 and has been doing underwater geophysical work for 18 months. The area comprises that beyond the shaikhdom's territorial waters. This concession was formerly held by Superior Oil Co., but was relinquished early in 1952.

Success in gulf . . . What has been described as the world's largest offshore oil field resulted from the only other drilling in the Persian Gulf.

Arabian American Oil Co. discovered Safaniya field on the northern coast of Saudi Arabia in this previous drilling. The field's reserves have been unofficially reported as several billion barrels. Aramco discovered the important Cretaceous sandstone field in 1951 in the first well drilled with a large drilling barge bought from Creole Petroleum Corp. Development has continued since, although the field is shut in.

The platform . . . The movable platform being used by Shell off Qatar was built in just over 9 months at a cost equivalent to around $1,400,000. Steelwork was fabricated in the Netherlands and shipped to Doha where erection was done by George Wimpey & Co., Ltd., London. The platform was built on top of two 1,000-ton pontoon barges and towed to the location.

At the site, eight steel spuds or legs in the structure were lowered to the sea bed, and the platform lifted on the spuds, clear of the steelwork of the pontoons, by a system of hydraulic jacks. This method allows the pontoons to be withdrawn during drilling. On completion of the well, the platform will be lowered on the pontoons and taken to the next location.

The main deck of the platform is 140 by 90 ft. and about 40 ft. above the level of the water. Accommodations are provided on the platform for two crews. Supply and relief personnel will be brought by boat from Doha, the company's main base camp.

During construction of the platform assembly, the heat was so intense that the steel had to be dipped into the sea before it could be handled. Aircooling was provided in certain enclosed spaces to enable men to work in them. The company considered that stormy weather encountered in the more exposed parts of the Persian Gulf made it inadvisable to use a smaller platform in conjunction with a drilling barge.

Gas Agreement Reached

An agreement for equable withdrawals of natural gas from two fields spanning the Dutch-German border has been reached among the operating companies involved.

The fields are Itterbeck-Tubbergen and Fronswegen-Denekamp. The agreement controlling their production was reached by three German companies, C. Deilmann Bergbau, Gm.b.H., Gewerkschaft Elwerath, and Preussag, and the Dutch company, Nederlandse Aardolie Mij. (Royal Dutch-Shell and Standard Oil Co. N.J.).

Specified withdrawals will be made during a 2-year period, and data will be collected to permit a survey of the exact percentages due each partner.

Italian Exports Up

Refining output surpasses needs of domestic markets

THE overbuilt Italian refining industry, with a capacity far in excess of the domestic demand, was able to increase its export shipments only slightly during the first 7 months of this year.

January-August exports of refined products from Italy totaled 3,069,286 tons, or about 21,000,000 bbl., as against 3,011,233 tons during the same period of 1953. The principal increases were in gasoline, up from 816,970 to 876,551 tons, and gas oil, up from 662,798 to 845,782 tons. Fuel-oil exports were down to 1,109,141 tons as compared to 1,273,602 tons in 1953.

During the first half of this year, Italian refineries operated at a rate of about 288,000 bbl. daily. Materials received for processing during the first half included 7,139,954 tons of foreign crude, 39,340 tons of domestic crude, and 64,450 tons of imported fuel oil. Charge stock received the first half of last year allowed a processing rate of roughly 232,000 bbl. daily.

Production of all major products during the first half showed a sizable gain. Gasoline output was up to 1,331,328 tons, gas oil to 1,423,722 tons, and fuel oil to 8,266,655 tons.

Aerial Ropeways Aid Search in South China Sea

BRITISH MALAYAN PETROLEUM CO., LTD. (Royal Dutch-Shell) is using aerial ropeways to reach drilling platforms in the South China Sea off the Coast of Brunei, British Borneo, in its effort to extend Seria field, the most productive in the Far East.

The equipment resembles the 3-mile-long Skyhook which Trans-Arabian Pipe Line Co. erected in the Persian Gulf in 1947 to offload pipe for Tapline.

British Malayan decided on the aerial ropeway because of the long periods of stormy weather in the South China Sea and the heavy swells experienced in this region for most of the year. At such times, vessels are prevented from coming alongside the drilling platform.

The first ropeway was built in 1952 when the company started its offshore drilling in an effort to extend the highly productive Seria field. The supports were anchored on four bearing piles and placed at 840-ft. intervals along the approximately 1-mile distance to the platform.

Last summer two additional drilling platforms were started nearly a mile offshore and about 3½ miles apart. In the ropeways connecting each of these to the shore, the driving mechanism previously incorporated in the car is placed on shore with the haulage ropes reeved through the cab. The driver operates both the driving mechanism and special lifting winches for carrying equipment. The new ropeways incorporate remote radio control features.

Production was found in the wells drilled last year from the first platform, and the company is preparing to lay a submarine pipeline to move this oil to shore. The onshore section of Seria field, intensively developed since World War II, produces about 100,000 bbl. daily, ranking it as the most productive area in the Far East.

In the offshore operations, four wells, one vertical and three deviated, are drilled from each platform. Each of the platforms together with ropeway to the shore costs around $560,000.

Iranian Pact Approved

Little opposition voiced as 40-year agreement clears parliamentary hurdle; shipments expected to start soon

Dahl M. Duff

AS was expected, only scattered opposition appeared during the final voting in the Majlis on the Iranian oil agreement.

The result was overwhelming approval, by a vote of 113 to 5, for the agreement under which an eight-company international group will operate the Iranian oil industry for the next 40 years. Early ratification by Iran's Senate was anticipated.

The government presented the agreement to the Majlis September 21, and it was immediately referred to a 36-man committee representing both houses. This group gave its approval October 4.

Official reaction . . . After the final vote, Prime Minister Zahedi told the deputies, "you have truly carried out your obligations to the nation." Dr. Ali Amini, the finance minister who represented Iran in the negotiations, said he hoped the agreement would be implemented "in a completely cooperative and cordial atmosphere and that the Iranian people will be able to enjoy the actual benefits of their natural resources. . ." Foreign Minister Entezam declared that "the real work" remains to be done in the application of oil revenues to social and educational reforms and agricultural and industrial improvement.

What little opposition developed to the agreement came mainly from followers of Mullah Ayatollah Mashani, a strong nationalist. During debate, the agreement brought several objections, one being that it guarantees the international oil-company group, or consortium, the right to buy Iranian exchange at the commercial rate instead of at the artificial official rate. Another opposition deputy declared the agreement was contrary to the Iranian nationalization law and that Iran, with its strategic position, should get more money from the United States in order to resist Communism.

Early resumption seen . . . If the agreement receives the Senate's approval and the Shah's signature by about November 1 as expected, operations will be resumed immediately.

L. E. J. Brouwer, former Royal

Dutch-Shell official at The Hague, who has been designated manager of the two consortium operating companies, arrived in Iran late in September with a party of technicians and has been at Abadan in connection with the reactivation of the former properties of Anglo-Iranian Oil Co., Ltd. Howard Page, a Standard Oil Co. (N.J.) director who negotiated the agreement for the consortium, also was in Teheran at the time of the Majlis approval of the agreement.

The first tanker shipment of Iranian oil will probably be made in the next few weeks. Around 12,000,000 bbl. of products have been piled up in storage at Abadan since the nationalization in 1951, and the flow of crude oil can be quickly started from the nearby Iranian fields to the docks at Abadan or Bandar Mashur.

Operations . . . The Iranian agreement gives the consortium a 3 months' start-up period before the first year's minimum guaranteed production of about 300,000 bbl. daily becomes operative. Originally, ratification was expected about October 1, but a series of what were termed procedural delays interfered with this timetable. Under the agreement, production will be stepped up to about 460,000 bbl. daily the second year, and 600,000 bbl. daily the third year.

The group of consortium engineers and technicians which has been studying the facilities is reported to have estimated that $35,000,000 will be needed to put the refinery in full operating condition. The consortium gave no minimum guarantee of refinery operation, but the companies hope to maintain throughput at about half the crude-production rate.

While the Majlis was considering the agreement, representatives of the Idemitsu firm in Japan, an independent oil distributor, arrived in Teheran to arrange continued purchases of oil from the National Iranian Oil Co. Under the arrangement with the consortium, N.I.O.C. is allowed a one-eighth royalty which it can take in kind and sell on the world market. Idemitsu, along with two independent Italian companies, made the only exports of Iranian oil in the 3 years between nationalization and the consortium agreement.

U. S. aid . . . The United States Government, which has been sustaining the Iranian economy during the period of nearly a year that the consortium agreement was being prepared and negotiated, was reported in Teheran to have made another $12,000,000 grant. This would bring total U. S. emergency aid to Iran to $82,000,000.

Papua to Get New Play

Australasian Petroleum selects wildcat location, plans to spud soon; Omati No. 1 nearing hemisphere's depth record

THE Australasian Petroleum Co. Pty. Ltd., controlled by Anglo-Iranian Oil Co., Ltd., and Standard-Vacuum Oil Co. plans to drill a wildcat in the western section of Papua in an almost unexplored region lying between the Gulf of Papua and the border of Dutch New Guinea.

A drilling site for the first test has been chosen on the Aramia River about 100 miles west from the gulf and about 25 miles north of Fly River. This area is about 125 miles farther west than the company's present operations at Omati.

Site preparations at Aramia will begin this month and drilling will start early in 1955.

Other activity . . . At Omati the sidetracked No. 1 bore has been deepened 146 ft. in 4 weeks to reach 13,704 ft. or 669 ft. short of the level where strong gas pressure blew out the original hole last June.

Omati No. 1 reached 13,743 ft. last year to become the deepest hole ever drilled in the Southern Hemisphere. When high pressure gas was encountered at that level, a bit jammed and fishing operations were both lengthy and unsuccessful. The hole was sidetracked after some 9 months delay.

Omati No. 2, about 2 miles westward, has remained at 7,500 ft. since August. Trouble arose in inserting 13⅜-in. casing to 5,600 ft. when a joint collapsed at 4,267 ft.

A National 130 has been installed in the place of a 50 rig to handle the heavier loads when drilling resumes.

Island background . . . Almost all exploration in Papua and New Guinea (both under Australian control) is being carried out by Australasian Petroleum and Island Exploration Co., Ltd. Both are owned by the exploration subsidiaries of Anglo-Iranian and Standard-Vacuum although the Australian firm of Oil Search, Ltd., holds a 10 per cent interest.

Since the first report of an oil seepage near the Vailala River, Papua, in 1911, about $30,000,000 has been spent on the search in Papua and New Guinea.

Houston Nomads Entertain Guests

Visitors at the October meeting of the Houston chapter of Nomads included this group. Front row, left to right, are Henry J. Estes, Basrah Petroleum Co., Ltd., Basrah, Iraq; J. A. Wirtenson, Shell, Maracaibo, Venezuela; F. Menez, S. V. Repal, Algiers; and John H. Murrell, DeGolyer & MacNaughton, Dallas. In the back row are J. M. Gray, McCullough Tool Co., Houston; J. E. Plemons, Shaffer Tool Works, Houma, La.; Don H. Manson, Asiatic Petroleum Corp., Houston; C. D. Richardson, Transcontinental Gas Pipe Line Co., Houston; and G. A. Metz, Mid-Continent Supply Co., Houston.

They Left Some of the Joints Out of this Gas Line

The missing joints aren't an oversight. They are a saving, made possible by using long, 50-foot lengths of Armco Welded Steel Pipe.

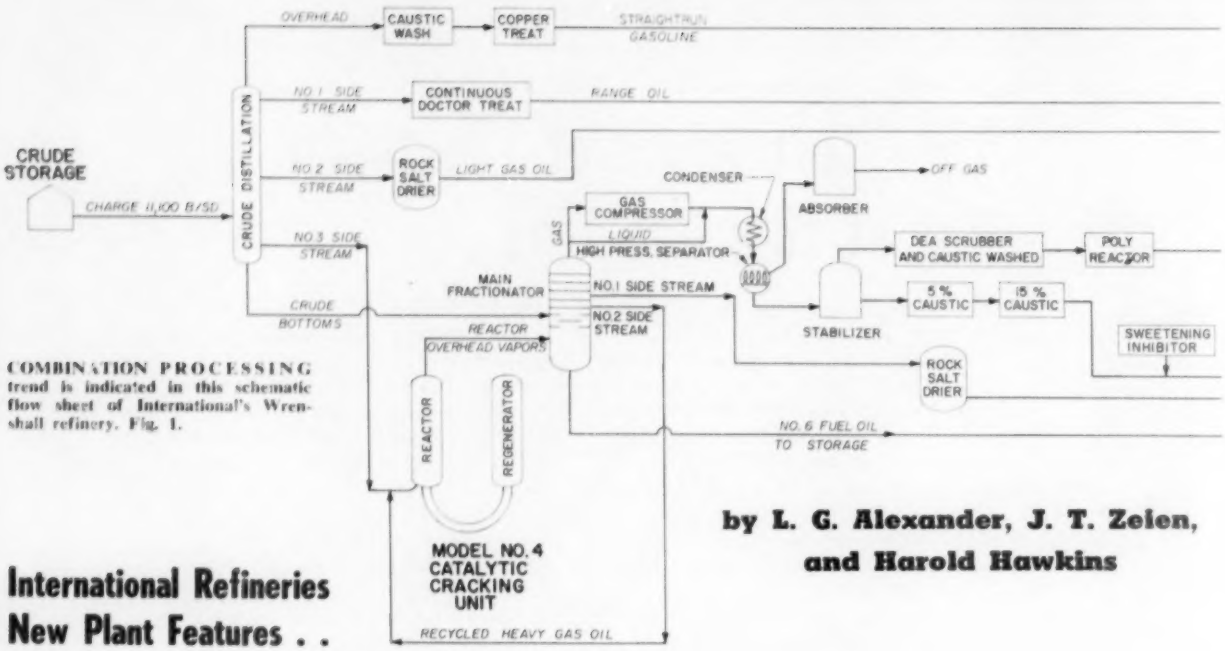
With Armco Pipe, only 106 joints are required per mile. That's 26 fewer than with shorter, 40-foot pipe. You eliminate the time, trouble and cost of making one joint in every five. The long lengths of Armco Pipe mean fewer pieces to haul and handle, too. Installation speeds along. Costs stay low.

In addition, the wide size range of Armco Pipe makes it easy to match your pipe specifications. Diameters range from 6 to 36 inches; wall thicknesses from 9/64- to 1/2-inch.

Armco Welded Steel Pipe is recommended for requirements in the Natural Gasoline and Natural Gas Divisions and wherever else you need dependable line pipe. Write us for complete information. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3344 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO WELDED STEEL PIPE

ARMCO



COMBINATION PROCESSING trend is indicated in this schematic flow sheet of International's Wrenshall refinery. Fig. 1.

International Refineries New Plant Features . .

Close Integration, Central Control, and New Ideas in Cat Cracker Instrumentation

by L. G. Alexander, J. T. Zeien, and Harold Hawkins

THE International Refineries, Inc.'s plant located in Carlton County, near Wrenshall, Minn., was designed to integrate closely a number of process operations. The refinery includes an atmospheric crude-distillation unit, Model IV F.C.C. unit, light ends and gas recovery, solid-bed phosphoric acid polymerization unit, and product treating.

All the process units including treating are built as one, in the sense that crude oil comes in at one end and finished products are sent to storage together, with elimination of the usual intermediate storage. These units are all controlled from a single graphic panel board.

The Model IV cat cracker instrumentation employs two cascade systems for regulation of cat cracker temperature and pressure which are different from those employed by other types of cat crackers. Two slide valves are employed in the regenerator stack. These were originally electric-motor driven, with the motor operating through an electronic bridge. This has since been revised to a combination pneumatic and electronic control resulting in minimum of maintenance, less catalyst loss and smoother operation.

Authors are vice president, technical service supervisor, and instrument engineer, respectively, with International Refineries, Inc.

Processing Background

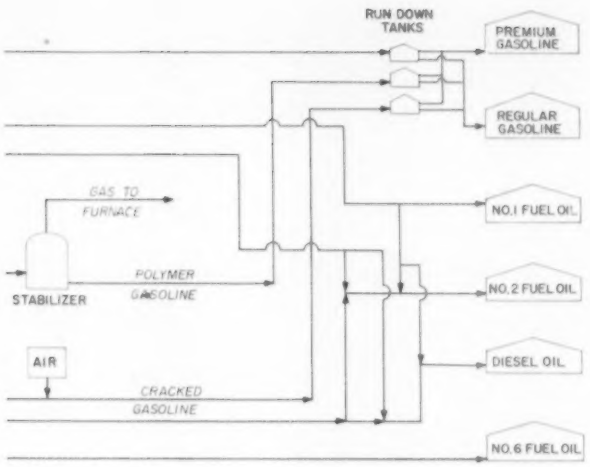
The Wrenshall refinery, in operation since April 1953, has a design feed rate of 11,100 bbl. per day. Canadian crude oil is delivered via Lakehead Pipe Line Co. trunk line to the refinery to be processed into motor fuel, middle distillates, and residual fuel oil as indicated in Fig. 1.

Atmospheric distillation . . . Crude oil is desalted and dehydrated, and after passing through the preheat chain and furnace enters the atmospheric distillation tower. Overhead gasoline from this tower is given a caustic wash and is copper chloride sweetened before being sent to tankage. The No. 1 side stream on the crude tower (range oil or No. 1 fuel oil) is processed further in a continuous doctor-treating unit. The No. 2 side stream, light gas oil, is rock-salt dried on the way to tankage. The No. 3 side stream, heavy virgin gas oil, is fed directly to the cat cracker reactor at a temperature of 600° F.

Combination unit . . . The cat cracker main fractionator handles the topped crude as well as reactor overhead. Bottoms from the crude-distillation tower are pumped into the main fractionator above a section of disk-and-doughnut trays located above the flash zone. Reactor overhead vapors enter the flash zone. As the vapors pass up through the disk-and-doughnut section, crude tower bottoms are stripped, resulting in approximately a 900° F. cut point.

The gas oil so removed from the crude bottoms is withdrawn at the second side stream of the main fractionator along with heavy cycle oil and the two combined streams are fed back to the reactor. None of this material is sent back to tankage, so that in effect International recycles to extinction all material which boils in the virgin feedstock boiling range. The other side stream on the main fractionator is light cycle oil which is passed through a rock-salt drier and sent to storage.

Other processing . . . Overhead from the main fractionator is stabilized and air inhibitor sweetened. Gas from the catalytic cracker is compressed and fed into an absorber in conventional manner. Propanes and butanes condensed from the overhead of the cracked gasoline stabilizer are scrubbed with di-



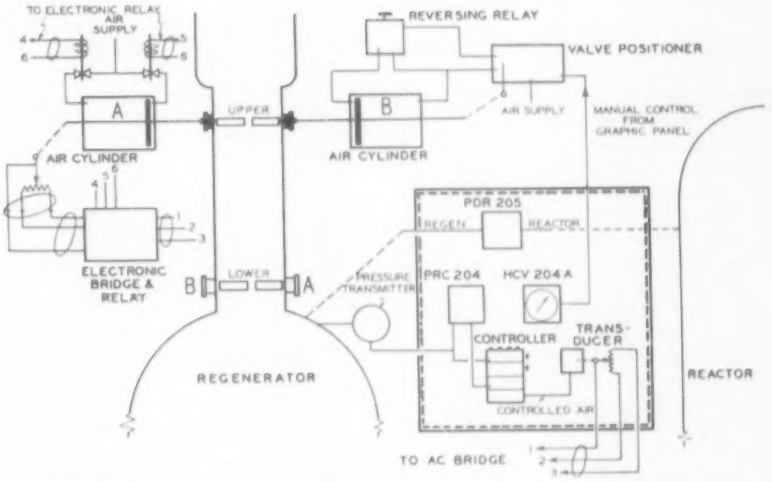
ethanolamine for H_2S removal and are then caustic and water washed before being fed to the polymerization reactor. Poly product is stabilized to the desired vapor pressure and sent to storage.

Products . . . The straightrun, cracked, and poly gasoline streams are blended to regular and premium grades. The three middle-distillate streams—No. 1 fuel oil, light virgin gas oil, and light cycle oil—are blended in varying proportions as they leave the process unit, for making fuel oils and diesels. Bottoms from the main fractionator (900° F. plus material) is sold directly as bunker fuel. The refinery also blends a number of specialty products such as tractor fuel and U. S. motor gasoline, and is currently producing jet fuel.

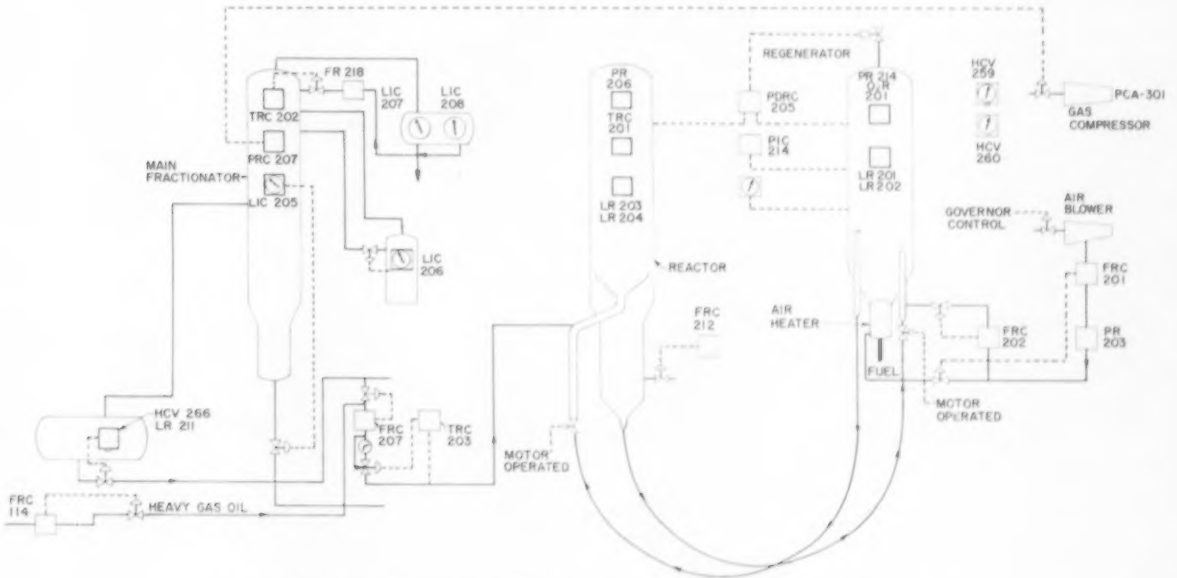
Cat Cracker Instrumentation

Operators have found single graphic panel, 35 ft. long, to be of considerable help in running the refinery. The entire plant operation is followed more easily on a single board and all required control index settings can be made at the board. Over 80 recording and indicating instruments are panel mounted. About as many controllers are mounted either on the back of the board or locally at the process.

Instruments employed on the Model IV catalytic cracking unit are listed in Table 1. Fig. 2 shows panel-mounted instruments for the catalytic cracking unit, with: (1) the original interconnected system involving PDRC-205 and PIC-214 for the control of regenerator pressure, and (2) another cascade sys-



CONTROL SCHEME for regenerator pressure is feature of cat cracker control. Fig. 3.



PANEL-MOUNTED INSTRUMENTS for Wrenshal's catalytic cracking unit. Fig. 2.

tem involving TRC-201 and FRC-202 for control of reactor temperature.

Regenerator pressure . . . Originally pressure differential between reactor and regenerator was measured by a differential-pressure cell and transmitted to board-mounted, recorder-controller PDRC-205. Output of PDRC-205 positioned set point of board-mounted miniature indicating controller PIC-214. This latter measured pressure in the regenerator and kept it at the set point determined by PDRC-205.

Control of the regenerator pressure was accomplished by varying the back pressure on this vessel through motor-operated slide valves in the regenerator stack. These slide valves were operated through an electronic bridge and relay in conjunction with the output from PIC-214.

Revision . . . The new control scheme for regenerator pressure is shown in Fig. 3. The regenerator pressure is controlled by a signal from a pressure transmitter which is fed to a panel-mounted recording controller. The output of the controller is fed to two transducers simultaneously which are a part of the electronic bridge. Any change in regenerator pressure results in an unbalance of the a.c. bridge circuit. This unbalanced circuit operates an electronic relay that energizes the solenoids regulating the operator for the stack valves. The stack valves continue to move until the bridge is brought back to balance and the original process change corrected.

The stack valves have two automatic operators which automatically position one-half of the sliding gates, and two hand control operators that are controlled manually from the graphic panel. This application of control instrumentation results in center line flow in the stack, allowing the board operator to divide the pressure drop over the two valves equally, thereby cutting down erosion on the stack lining and valve proper.

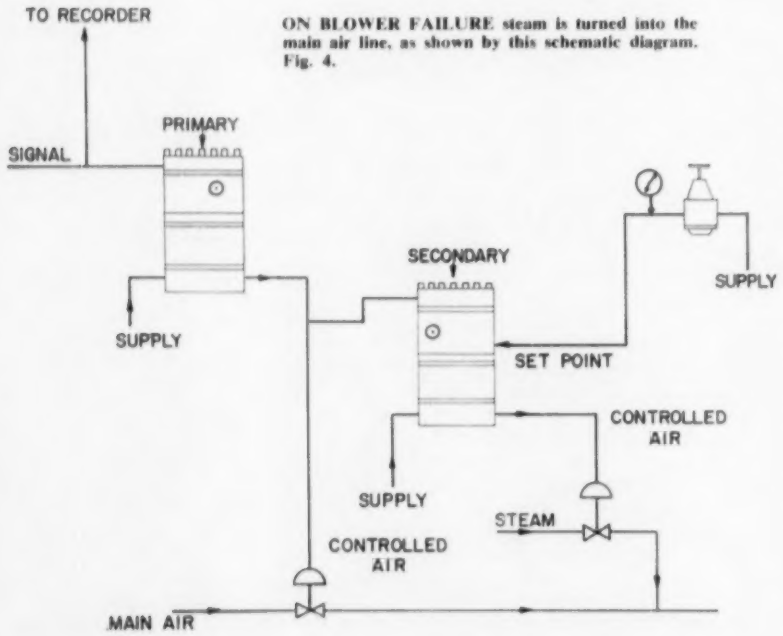
On the sketch (Fig. 3) control is shown for only one valve (upper). The lower valve has an identical hookup to the upper with one exception; the output of PRC-204 positions both transducers but the transducers' signal is fed to an electronic bridge and relay for upper and lower stack valves. Each valve employs a separate bridge and electronic relay.

Any half of the sliding gate valves can be readily adapted for automatic control. After a period of operation, the automatic control is switched to the opposite half of the valve to prolong the life of the equipment and to divide the erosion wear equally on the gate proper.

Reactor temperature . . . A pneumatic cascade system is used to control reactor temperature. The output from panel-mounted TRC-201 which measures and regulates temperature in the reactor, positions the set point of FRC-202. This records air flow to spent-catalyst riser of regenerator and regulates the air circulation according to the dictate of the master controller TRC-201. By regulating catalyst circulation from reactor to regenerator in this manner, indirect control of reactor temperature is obtained.

Fig. 4 indicates the application of a fairly standard method for turning steam into the main air line in event of blower failure. The output from the primary controller is balanced against the set-point pressure of the secondary controller to determine the output of the secondary controller. Whenever the pressure in the main air line from the blower drops below the set point of the secondary controller, the latter actuates a steam valve admitting steam into the main air line.

The Wrenshall refinery was designed and constructed by Lummus Co. Instruments were furnished by Minneapolis-Honeywell Regulator Co.



ON BLOWER FAILURE steam is turned into the main air line, as shown by this schematic diagram. Fig. 4.

TABLE 1—PANEL-MOUNTED INSTRUMENTS FOR MODEL IV UNIT

TRC-202—Controls overhead temperature of main fractionator by regulating reflux. FR-218 records the amount which is refluxed.

PRC-207—Controls speed of gas compressor which in turn controls flash zone pressure on main fractionator through the reactor. The output of PRC-207 is hooked up with a secondary controller which has a manual set point. In the event the pressure gets too high the secondary controller operates a valve which vents the excess pressure to flare.

LIC-205—Controls the bottoms level in main fractionator by controlling flow to storage.

LIC-207—Water drawoff level.

LIC-208—Gasoline level.

LIC-206—Lean-oil level.

FRC-207—Controls charge flow to the reactor. In the event the flow drops below a predetermined valve it operates a secondary controller which cuts steam into the charge line. TRC-203 controls temperature of charge by bypassing an exchanger.

TRC-201—Controls temperature of the reactor by regulating the catalyst circulation. This controller is in cascade with FRC-202 in regenerator.

PR-206—Records reactor pressure.

LR-203 and **LR-204**—Record level and density, respectively, by reactor catalyst bed.

FRC-212—Controls stripper steam flow.

PDRC-205 and **PIC-214**—Cascade control of regenerator pressure. This revised as explained elsewhere.

LR-201 and **LR-202**—Record level and density of regenerator catalyst bed.

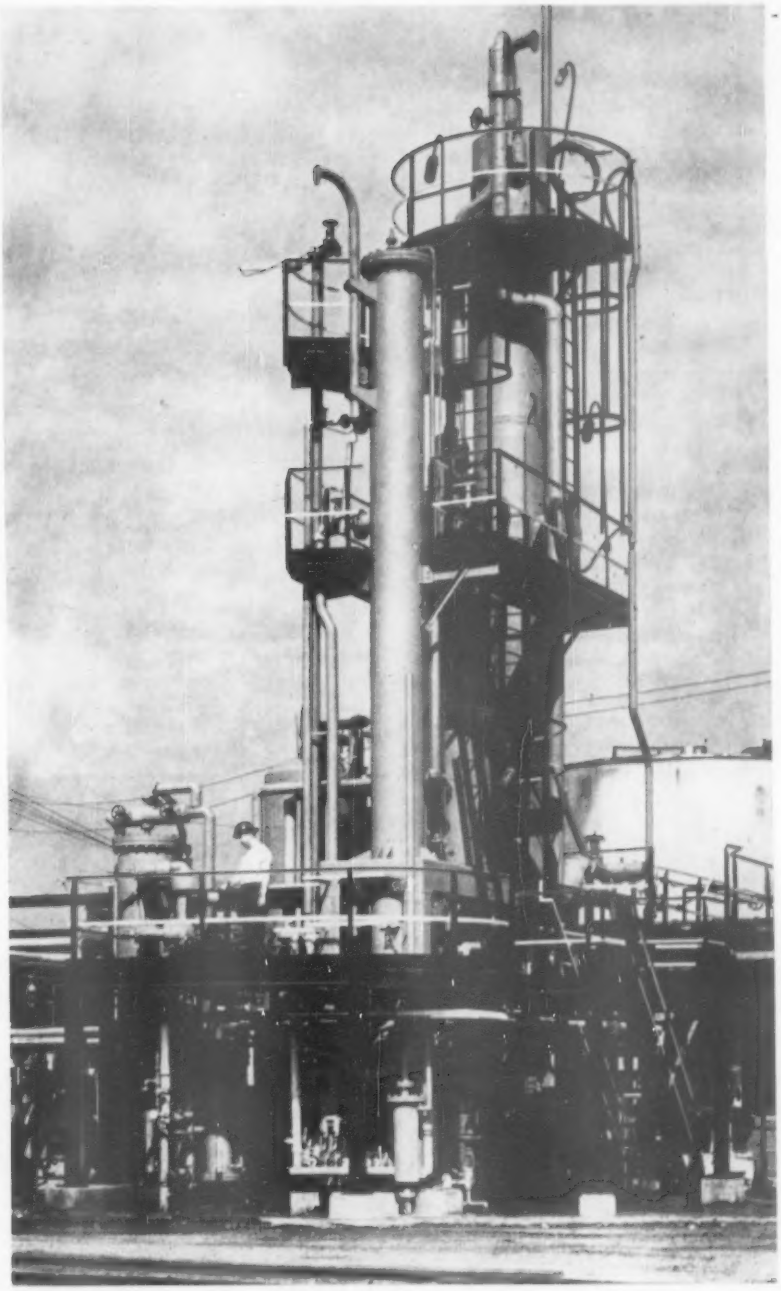
O_2R-201—Oxygen analyzer records excess oxygen in regenerator. This unit is a Beckman analyzer with a Honeywell transmitter. Measures oxygen content by the para-magnetic principle.

FRC-202—Controls air to riser. This controller is in cascade with TRC-291 in reactor.

FRC-201—Controls main air pressure. It has a secondary control system which will cut steam into main air line in the event of air blower failure.

PR-203—Main air pressure.

HCC-259 and **HCV-260**—Hand control units for emergency spray water.



HYDROFINING UNIT pictured here is in operation finishing transformer and turbine oils at Sarnia, Ont., refinery of Imperial Oil.

Highlights of Hydrofining . . .

- Continuous operation, simple equipment.
- Yield on feed exceeds 99.5 per cent.
- Waste disposal no problem.
- Improved physical and chemical properties.
- Flexibility in quality control.

Hydrofining 2

Hydrofining Improves Low-Cost-Lube Quality

by Dr. W. A. Jones

LUBE hydrofining is a new application of the general Hydrofining technique. It can be applied to the refining of low-cost lubricants replacing acid treating or it may be applied as the final process to ensure uniformity of color and other properties of lube base stocks prepared by extraction and, where necessary, dewaxing.

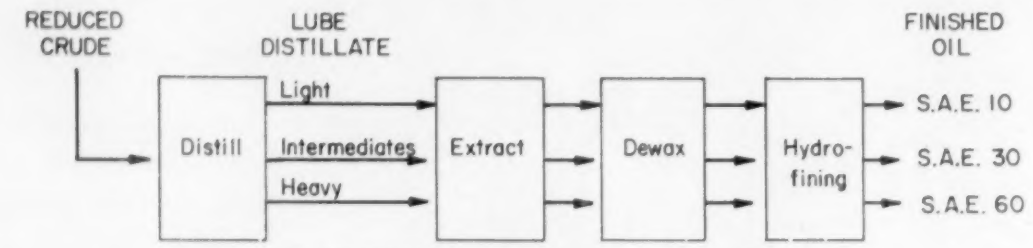
The conditions for the process were developed from investigations carried out in the laboratories of the research department of Imperial Oil, Ltd., at Sarnia, Ont. Based on this work a 600-bbl. per day plant is finishing transformer and turbine oils at Sarnia, and a 2,000-bbl. per day unit is under construction at Edmonton, Alta., for the manufacture of motor oils and industrial lubricants.

The Sarnia unit, besides being the first application of Hydrofining to lube finishing, is the first commercial use in Canada of hydrogenation for petroleum processing.

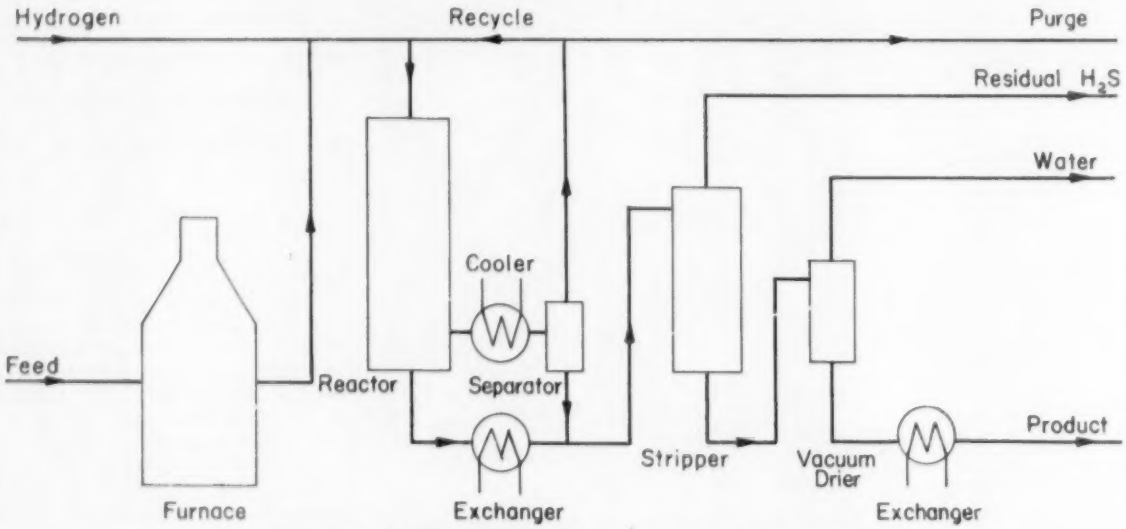
Advantages . . . There are several advantages for Hydrofining as a final processing step for lubes. Some of these are:

1. The operation is continuous, using relatively simple equipment.
2. The finished oil yield on feed exceeds 99.5 per cent.
3. There are no major waste-disposal problems.
4. Color, odor, acid value, demulsibility, carbon residue, sulfur content, and response to some additives are improved.
5. Flexible control of lube quality from varying crude sources is possible.

Basic considerations and process results show that the above advantages outweigh small disadvantages that may



PROCESSING SEQUENCE for lube manufacture in the Sarnia refinery. Fig. 1.



HYDROFINING PROCESSING steps for treating lubes at Sarnia. Fig. 2.

result from partial or total selective conversion to hydrocarbons of so-called "natural" inhibitors.

Trace elements . . . Lube distillates contain varying amounts of trace elements such as sulfur, oxygen, and nitrogen which are present as a small part of various, unidentified compounds. Some of the compounds give desirable properties. However, the same or other compounds impart many undesirable characteristics. In present refining practice, selective separation of the desired trace element compounds is only partially achieved. A large portion of the total is removed, together with aromatic hydrocarbons, when the distillate is solvent extracted to improve viscosity-temperature properties.

The remainder is then controlled in conventional finishing processes so as to leave only the so-called "natural inhibitors" in the finished oil. Manufacture of base oils which will meet the arbitrary laboratory standards based on the presence of these compounds frequently requires either careful selection of crude, or extraction to a very low-finished-oil yield.

In recent years, natural inhibitors have assumed less importance because of the trend towards control of service performance by means of synthetic trace-element compounds, i.e., additives. Therefore, the objective of a lube-finishing process is now mainly to give a base oil of uniform quality with maximum response to additive.

Hydrofining was developed from investigations aimed at improving the stability of turbine and transformer oils by removing trace elements. It not only improved additive response of the base oil but also gave excellent decolorization and control of the laboratory oxidation properties dictated by natural inhibitors. Of a number of finishing methods investigated, it was considered the most practical as a refinery process.

Process Sequence

Fig. 1 shows the process sequence for production of motor oils which is planned at Edmonton refinery.

In this sequence, reduced crude from western Canadian sources is vacuum distilled to give three fractions—light, intermediate, and heavy lube distillate. These distillates are then extracted to required viscosity index, dewaxed to required pour, and finally hydrofined to required color and other properties. The same process sequence is being

THE AUTHOR

Dr. William A. Jones is senior research chemist in the research department, Imperial Oil, Ltd., Sarnia, Ont., Canada. Before he became associated with Imperial in 1946, Dr. Jones was employed in wartime work by the Canadian Government and worked briefly with Donald-Ross Co. He holds B.A. and M.A. degrees from University of Saskatchewan, and the Ph.D. degree from University of Chicago.

used at Sarnia for production of turbine oils. For transformer oil, a low cold-test crude is used, and the dewaxing step is unnecessary.

This sequence allows mild Hydrofining conditions to be used and also permits flexibility for control of product yield and quality. Eventually, for particular situations, it is possible that a more severe Hydrofining treatment prior to extraction may be attractive from an economic and technical viewpoint.

This additional process step could further improve yields from extraction, and upgrade the quality of the extracts. However, it would not completely eliminate the necessity for finishing, and consequently the above sequence is a logical first application of Hydrofining to lube processing. Using this sequence, it is possible to regulate product quality in both the extraction and finishing steps.

Equipment . . . The equipment for Hydrofining is illustrated by Fig. 2. Essential parts are feed pumps, hydrogen compressor, oil heater, reactor, and product strippers. Cartridge-type filters are installed to filter feed and product. The necessity for a feed filter is dependent on the amount of suspended inorganic material. The product filter is required to remove a small amount of catalyst carried out of the reactor during startup or after pressure surges. In normal operation the amount of material to be removed by both filters is relatively small, and operating time before cartridge removal is long.

The equipment may be modified for particular situations. Where byproduct hydrogen is available at sufficiently high pressure, the hydrogen compressor would not be necessary. Also, if desired, steam-vacuum stripping can be replaced by a single-stage vacuum stripper or by a flue-gas stripper operating at atmospheric or higher pressure. The stripping system which is shown in the diagram gives the best operating flexibility for control of product quality and for disposal of waste gases.

The equipment is designed for operation at moderate temperatures and pressures and is in general relatively simple.

Operating Conditions

Operating conditions which can be used to control final product quality are pressure, temperature, excess hydrogen rate, and space velocity (volumes of oil/volume of catalyst/hour). The particular operating conditions used will be dependent on the type of feed stock and the product quality required. For extracted light and intermediate lubes it has been found that satisfactory motor-oil quality can be obtained from Hydrofining under very mild treating conditions. On heavier stocks and for stocks to be used for specialty oils, treatment using more severe conditions gives better quality.

The extraction Hydrofining sequence allows considerable flexibility in control of product quality and therefore it is possible to choose design conditions which balance throughput rates from each of the processing units.

Catalyst and catalyst life . . . A modified molybdena on alumina preparation has been selected as the catalyst for use in the Hydrofining installation at Sarnia, and will also be used at Edmonton. This preparation was selected from over-all consideration of cost, availability, strength, decolorizing, and desulfurizing activity. However, there are other catalysts that give as good or better decolorization; some of these, which are lower in cost, are satisfactory for processing lighter-grade motor-oil base stocks. Choice of catalyst for any particular installation is therefore dependent on characteristics of the feed stocks and required quality of the finished oil.

Long catalyst life can be expected because of the mild treating conditions and the relatively clean feed stocks. The catalyst charge in the Sarnia Hydrofiner has been in use for approximately 6 months and is still giving satisfactory decolorization and desulfurization. For this length of service the amount of oil treated is equivalent to approximately 25,000 bbl. per ton of catalyst and it seems likely that the catalyst life will allow treatment of at least 50,000 bbl. per ton.

Yields . . . The mild conditions give yields of finished oil (not including mechanical losses) of 99.5 per cent or higher on feed. For motor-oil stocks only about 0.1 per cent of the feed is converted to hydrocarbons of lower boiling range. Laboratory distillation data on the product show that Hydrofining converts a small amount of high molecular-weight material to intermediate rather than low molecular weight.

Consequently, flash point and viscosity are not greatly decreased. Since the small amount of overhead removed during stripping is suitable for fuel products, the over-all process loss is negligible. Gaseous byproducts such as hydrogen sulfide and ammonia are burnt, but can also be safely vented to the atmosphere because of their low concentration.

Product Quality

Hydrofining improves several laboratory inspection and stability tests which are generally considered to indicate the suitability of the product for various uses. Since these laboratory tests are related to specific services, the quality data is outlined in relation to them.

Motor and industrial oils . . . From data in Table 1 it will be noted that for 10, 30, and 60-grade oils, Hydrofining slightly reduces viscosity and slightly improves viscosity index. This

TABLE 1—EFFECT OF HYDROFINING ON LABORATORY QUALITY MOTOR OILS FROM LEDUC CRUDE

	10 grade		30 grade		60 grade	
	Charge	Product	Charge	Product	Charge	Product
Viscosity S.s.U. at 100° F.	165	157	607	575	1,708	1,603
Viscosity index	85	91	87	90	90	91
Sulfur, per cent	0.19	0.05	0.19	0.03	0.20	0.06
Color, Robinson	11	21	7	17	1	10
S.E. number	64	36	260	20	1,200	150
Conradson carbon	0.03	<0.01	0.04	0.01	0.27	0.14
Sligh oxidation, 24-hr. sludge, mg./10 g.	46	<1.0	21	<1.0	2	1

TABLE 2—EFFECT OF EXTRACTION LEVEL AND HYDROFINING SEVERITY 30-GRADE MOTOR OIL, LEDUC CRUDE

	74 V.I.			95 V.I.		
	Charge	Product		Charge	Product	
Viscosity S.s.U. at 100° F.	804	768	700	495	495	487
Viscosity index	74	75	75	95	94	94
Sulfur, per cent	0.38	0.21	0.07	0.11	0.06	0.03
Color, Robinson	2	11	11	10	22	20
S.E. number	600	170	120	150	50	60
Conradson carbon	0.24	0.15	0.03	0.06	0.01	0.01
Sligh oxidation	38	46	11	9	6	1

TABLE 3—COMPARISON HYDROFINING—30-GRADE LUBE LEDUC OR REDWATER, SAME HYDROFINING CONDITIONS BOTH STOCKS

	Leduc		Redwater	
	Charge	Product	Charge	Product
Viscosity, 100° F.	607	575	622	570
Viscosity index	87	90	81	88
Sulfur, per cent	0.19	0.03	0.25	0.03
Color, Robinson	7	17	7	18
Conradson carbon	0.04	0.01	0.05	0.02
S.E. number	260	20	600	110
Sligh oxidation sludge	21	<1.0	10	<1.0

increase in viscosity index is obtained with no increase in cloud or pour point, at least for the lube stocks which have been treated to date. Color is an important property for some industrial oils and is required to insure uniformity of appearance of motor oils. Data in Table 1 shows that Hydrofining gave products of excellent color, and better color can be obtained with more selective conditions. Low sulfur content may be desirable in some industrial oils but is not at present required for satisfactory motor oils. Sulfur content after Hydrofining is given mainly to indicate severity of treatment and relationship of quality to sulfur content.

Low steam emulsion number is desirable for many industrial oils. The data show that this property was improved for all the stocks treated.

Low Conradson carbon residue is considered desirable for motor oils and for diesel oils. Results show that Hydrofining improves this property.

The Sligh oxidation test gives some indication of the sludge that might be formed from oils in high-temperature services where fuel byproducts are not a factor. The data show that, if required, excellent Sligh values can be obtained by Hydrofining. Also, it is possible to prepare oils which give low sludge and viscosity increase in the Indiana oxidation test.

Table 2 presents data to show the effect of Hydrofining on some laboratory tests on intermediate lube distillate extracted to different viscosity index levels. For the 74 V.I. level, Hydrofining markedly improves color, S.E. number, and carbon residue. Sligh value is improved by the more severe treatment, which gave greater sulfur reduction. For the 95 V.I. compared to the 74 V.I. stock, Hydrofining gave a product of better color which had slightly lower sulfur content, Sligh value, carbon residue, and steam emulsion number. The data for this table illustrate the flexibility for control of finished oil yield and product properties resulting from a combination of extraction with Hydrofining.

The above results were obtained from lube stocks from Leduc crude. Similar results were shown when Hydrofining stocks from Redwater crude. This is illustrated by the comparison data in Table 3.

The above laboratory tests are indicative of the properties of the finished oil and are useful for controlling uniformity of the finished base oil. However, performance in engine tests is the final quality test for motor oils. In high-temperature engine tests, oil Hydrofined to low sulfur content and containing additives performs slightly better than products from conventional finishing. Without additive, Hydrofined oils showed improved sludge-dispersing characteristics in the low-temperature FL-2 test.

Turbine oils . . . In the laboratory the Staeger and A.S.T.M. oxidation tests are used to assess the stability of turbine oils from Hydrofined stocks. Table 4 show data for 10 and 30-grade oils from Leduc crude. For both grades, Hydrofining gave a base oil which, with additive, showed a doubling of oxidation life. In addition, the turbine oil from the Hydrofined lube showed better demulsibility and rust-preventing characteristics.

In actual service, Hydrofined turbine oils are showing satisfactory stability in several commercial turbines.

TABLE 4—COMPARATIVE STABILITY* TURBINE OILS FROM HYDROFINING EXTRACTED, DEWAXED LEDUC DISTILLATES

	10 grade		30 grade	
	Charge	Product	Charge	Product
Color, Robinson	11	+9 Say.	11	22
Sulfur, per cent	0.12	0.03	0.11	0.04
Staeger oxidation:*				
Life hours	190	530	190	460
Color, Robinson	3	5	2	4
A.S.T.M. oxidation:*				
Life hours	1,050	2,000	800	1,450
	Rust at 500 hours		Rust at 300 hours	

*Treated oil plus 0.3 per cent antioxidant plus 0.4 per cent rust inhibitor.

TABLE 5—COMPARATIVE STABILITY* TRANSFORMER OIL FROM HYDROFINING EXTRACTED TIA JUANA DISTILLATE

Extraction—	Severe		Mild	
Finishing—	Conventional	Hydro	None	Hydro
A.P.I. gravity	35.0	35.0	32.5	33.1
Color, Saybolt	+8	+12	16 Rob.	0
Sulfur, per cent	0.12	0.02	0.42	0.06
S.E. number	20	15	50	15
A.S.T.M. sludge test, break time-hours†	80	150	40	85
Sludge, 14 days	0.60	0.10	0.80	0.36
Power factor, 100° C.	0.4-0.6	0.2	0.8	0.4

*After addition of 0.05 per cent antioxidant. †Approximate time at which interfacial tension decreases to below 25.

Transformer oil . . . Low sulfur content, good oxidation, stability, good demulsibility, and low power factor are considered to be desirable properties in a transformer oil. Table 5 shows the effect of Hydrofining on these properties for severely and for mildly extracted distillate from Tia Juana crude. In conventional practice, severe extraction is necessary to give required sulfur content.

Using Hydrofining, a product with the required sulfur content can be prepared from mildly extracted distillate. This product shows as good demulsibility and electrical properties and, after addition of the same antioxidant concentration, equivalent oxidation stability.

Hydrogining, therefore, allows appreciably higher yield of finished oil with the same sulfur content, electrical properties, and stability. For the same yield (same degree of extraction), Hydrofining gives a product with better electrical properties and appreciably better oxidation stability after addition of antioxidant. Furthermore, recent data indicates that a product of satisfactory stability without antioxidant can be prepared from selective extraction followed by Hydrofining.

Economics . . . The economics of lube Hydrofining depend on the usual factors of plant size, product-quality requirements, and feed stocks. The capital investment for the Sarnia installation was in the neighborhood of $200 to $300 per barrel per day capacity, which is lower than the conventional finishing processes. This low capital cost is dependent on a supply of byproduct hydrogen which is now available in several refineries. Operating costs depend on plant size. For a 2,000-bbl. per day unit, costs would be in the order of 30 to 40 cents per barrel of feed, assuming hydrogen at fuel-gas value. Since the finishing process avoids disposal problems, conserves refined oil, and permits a lower degree of extraction, it would appear to be attractive to a number of refineries.

Acknowledgment

The development of lube Hydrofining at Sarnia has been due to the work of a number of individuals in various departments. Original exploratory work was initiated by Dr. R. K. Stratford and Dr. G. W. Gurd. Engineering process design was developed initially by C. P. Warkentin and J. C. Maguire of Imperial's engineering department. Successful plant operation was achieved under the direction of A. E. Vidal and W. J. Johnston of the Sarnia refinery staff.

Stub-Ending Drill Collars

. . . by electric-arc welding

This relatively new process is entirely feasible if proper know-how is applied

by W. S. Bachman

SATISFACTORY stub welds can be made at field machine shops with reasonable factors of safety over the strength of the drill-collar pin and box connection if proper welding procedures are used. This is indicated by fatigue data available on thick hand-welded sections, but these points must be remembered:

- The weld must be free of inclusions or defects, and a number of satisfactory weld materials are available to help insure this.
- Proper preheat and stress relief are very essential to the success of arc welding drill-collar stubs.
- A proper design using a backup plug or ferrule to eliminate the first bead and to provide a smooth bore is advantageous.

The idea of electric arc welding stubs on drill collars is relatively new. In the Mid-Continent, the first large number to be welded successfully was done in the middle forties. This repair practice on a large scale was brought about by the use of long tandem strings of drill collars in the harder rock country.

In using long strings of drill collars to apply more weight on the bit, the number of connection failures due to fatigue increases greatly and hence the drill collars shorten in length relatively fast as new connections are cut on the ends. A drill collar approximately equal to a joint of drill pipe in length is needed in order to give proper height to a stand of two or three collars to reach the board in the derrick during trips to change the bit.

Author is with Drilco Oil Tools, Inc., Midland, Tex. Paper presented at petroleum-mechanical engineering conference of A.S.M.E., Los Angeles, September 29, 1954.

The forerunner of stubbing drill collars dates back to the early thirties to the attempts that were made to weld drill pipe to tool joints by the hand-weld method. After extensive laboratory and field tests, it was found that a ferrule-type weld was the most satisfactory from a strength standpoint. An illustration of one of these first ferrule-type welds is shown in Fig. 1.

Hand-Welded Drill Pipe to Tool-Joint Connections

It is interesting to study the fatigue strength of ferrule-type hand welds to determine why this method of welding later proved satisfactory on drill collars, but was not particularly successful on tool joints. A large number of full-size rotating-beam fatigue tests were made on welded drill-pipe sections in the laboratory by one of the major manufacturers.[1] The results of these tests are shown in Fig. 2. It may be noted that the fatigue stress to cause failure in the weld at 1,000,000 cycles is approximately 15,000 psi.

The factor of safety of a tool joint-to-drill pipe connection is based on the strength of the body of the pipe. It has been found from full-size fatigue tests on drill pipe that the fatigue strength of the body of the pipe varies from a nominal 27,000 to 32,500 psi. for the best run to be expected.

Using 4½-in., 16.60 lb. per ft., Grade D drill pipe, for example, it can be calculated that the factor of safety of the connection over the pipe varies from slightly over 1.0 to less than 1.0 for pipe with commercially available upsets on the ends. This would mean some failures at the joint rather than in the body of the pipe. Therefore, other methods of welding which have higher fatigue strengths in the welds are necessary on drill pipe.

Hand-Welded Drill Collar Sections

On drill collars the problem of fatigue strength of the welded sections is unlike that of drill pipe in that the welded section must have a factor of safety over the pin-and-box connection strength, not the body of the drill collar. The pin-and-box connection is the weakest member of the drill-collar string. Because the weld sections are quite thick, a relatively low fatigue strength in the weld section will produce favorable factors of safety over the connection strength.

For example, a 6¼-in. o.d. by 2¼-in. bore drill collar with 4½-in. A.P.I. full-hole connections has a factor of safety in the weld section over the connection strength of 1.25 to 2.42 if a good weld, reasonably free of defects, is obtained.[2]

A good welding technique is essential to realize the above factor of safety. The weld must be free of holes and slag inclusions. Proper chipping of the flux off the weld between each pass cannot be emphasized too strongly.

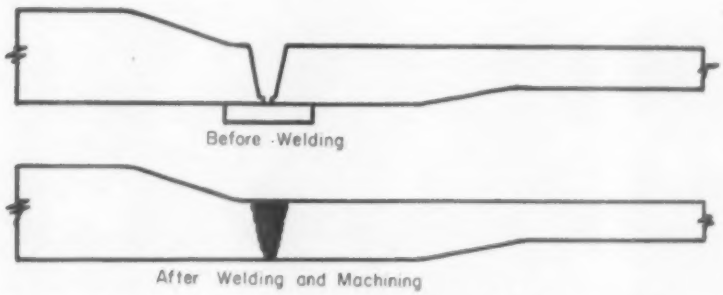


Fig. 1—Early attempts to weld tool joints to drill pipe by ferrule weld method.

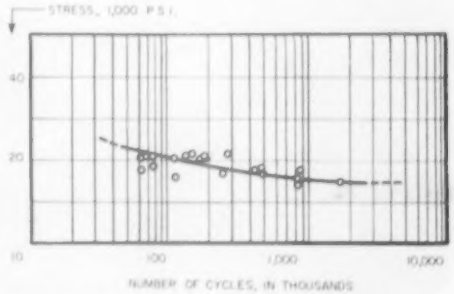


Fig. 2—Fatigue curve, hand-weld connections, failures in weld.[1]

Fig. 3—Bore built up with weld before machining for backup plug or ferrule.

Fig. 4—Machined end of drill collar with plug inserted.

Fig. 5—First bead run in weld.

Generally a rod with a low-hydrogen type of coating is recommended, although other types of rod can be satisfactorily used if the proper preheat is applied to the sections to be welded.

Soft in center . . . In a weld made with a low hydrogen, 70,000 psi. rod, it is interesting to examine the hardness traverse through the weld section. As each successive bead is run, it has the effect of annealing the beads below it. So instead of having a weld deposit that would have a tensile strength of 70,000 to 80,000 psi., a specimen pulled in the weld section of this joint indicates a tensile strength of only 60,000 psi.

This softness in the center of thick welds is typical of deposits made with most of the welding rods examined. It is interesting to note that some of the welding rods checked were specified by the manufacturers to have strengths in excess of 100,000 psi., but after making a thick weld a number of these were also soft. Where pure tensile strength is not too much of a factor because there is a large cross-section area at the weld, these softer welds have an advantage from a fatigue standpoint over harder, more notch-sensitive materials in preventing cracking from rough surfaces.

New rods are better . . . During World War II high-strength weld materials were developed which did not anneal so readily in thick deposits. Two different rods of this type checked seemed to be similar in that a relatively large amount of manganese was found in the weld deposit. A weld made from one of these higher-strength rods is not subject to annealing in a thick deposit. Even after stress relief at 1,200° F., the weld is greater than 100,000 psi. tensile.

Although there is not a large amount of fatigue data available on large size specimens welded with these newer, higher-strength rods, from the several tests that have been made, these rods appear to have a fatigue strength of 17,000 to 18,000 psi. at 1,000,000 cycles. This is a slight increase over the older conventional rods.

From the above data it readily becomes apparent that the more important elements in stubbing drill collars by the arc-welding methods are the welding techniques, the preheat, the stress relief after welding, and the design of weld rather than the welding rod as long as a high-quality rod is used.

Preheating weld . . . The proper pre-

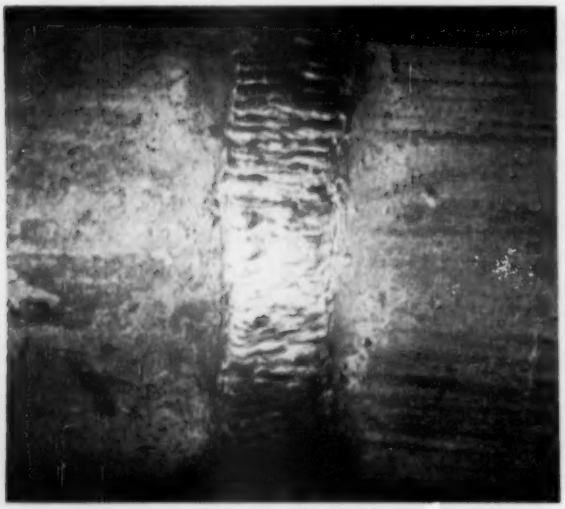


Fig. 6—Finished weld. One additional layer of beads has been run on outside diameter of collar.

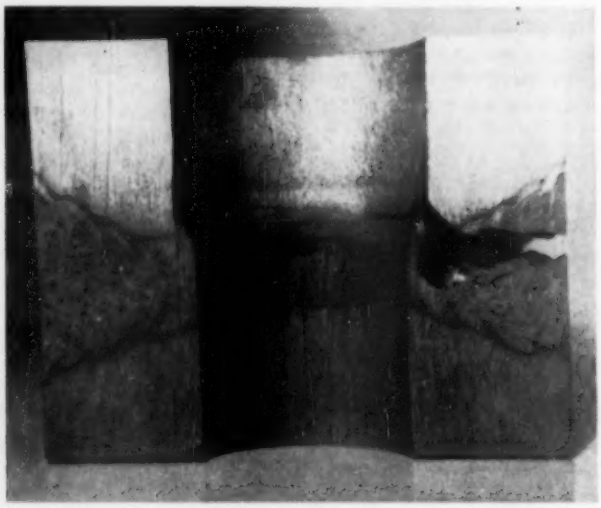


Fig. 7—Weld failure showing pin holes in weld and crack leading into weld from the bore.

Fig. 8—Weld failure where backup ferrule was not used.

heating and stress relieving of the weld cannot be over emphasized. As a general practice, a preheat of 600° to 800° F. is advisable. This temperature should be checked frequently. When several initial beads are run, only a small amount of external heat is required if the welder continues to weld and chip the slag until the stubbing is completed. Although it is possible to weld the A.I.S.I. 4140 alloy steel normally used in drill collars with a low-hydrogen rod at preheats less than 600° F. and have no external cracking, the high thermal gradient between the weld and the drill collar would certainly increase the residual stresses in the weld and heat-affected zone.

The preheat definitely reduces the amount of martensite formed adjacent to the weld in the heat-affected zone of the base metal. The minimum amount of formation of this brittle material in the weld zone is very important.

Stress relieving weld . . . To get an idea of the residual stress set up in the weld during welding, the gap on the outside of the weld will sometimes close up as much as ⅛ in. between the time the starting bead and the final bead is run.

A stress relief after welding of 1,200° F. with a soaking time of 2 to 4 hours is strongly recommended. The rate of cooling should be fairly slow. In most cases the collars are allowed to cool to 300° to 400° F. in the furnace when the heat is cut off.

It is believed that thermal stress relief acts in two ways to remove locked-up stresses. First, at the elevated temperature, the tensile strength is reduced much more than the modulus of elasticity, thus allowing some plastic flow to occur. This is particularly true of materials such as alloy steels. Second, stresses are relieved by creep and relaxation phenomena generally associated with steels at high temperatures.

Making the weld . . . Figs. 3-6 show the steps necessary to make a weld using a ferrule or a plug for a backup. It is advisable to first build up the bore at the end of the collar with weld metal after preheating the collar, as shown in Fig. 3. As a result of circulation of mud through the drill collar during drilling, the bore of an old collar will usually be washed ⅛ to ¼ in. greater than the original bore. The diameter of the original bore or less is desirable to provide additional connection strength if the drill collar is stubbed on the pin end. The bore is not so critical if the drill collar is stubbed on the box end.

After the inside diameter of the collar is built up, the weld is machined slightly less than the new bore and a drive-fit plug or ferrule is made and forced into the end of the collar, Fig. 4. If both ends of the collar are to be stubbed, a ferrule should be used on at least one end to allow heated gases in the bore to escape. The plug should also be force fit into the bore of the stub.

The drill collar should then be preheated, and the weld area should be held at the preheat temperature during the entire time the weld is being made. In some cases a groove is cut in the plug or ferrule for the first bead. This insures that the first bead is completely removed when the bore is machined out. Fig. 5 shows the first bead.

When weld is completed . . . When the weld is completed, as shown in Fig. 6, at least one adidtional layer of beads has been run on the outside diameter of the collar. These beads are machined off to eliminate rough-weld surface defects and to anneal the material immediately below the surface of the drill collar. After all welding is completed, the welded section of the collar is placed in a furnace and stress relieved. After stress relief the ferrule is machined out, removing the first bead, and the outside diameter is turned removing the last beads.

Field failures in welds . . . Almost without exception, failures in stubbed drill collars can be attributed to poor welds or poor weld design. Fig. 7 shows a failure or "washout" in a weld with numerous pin holes and slag inclusions. Also the ferrule which was made integral with the stub was not machined out. In effect there was a crack to the first bead by virtue of the design itself.

Fig. 8 shows a crack starting in the first bead when no backup plug or ferrule was used. Both the possibility of a crack originating in the first bead and the reduction of area at the welded section condemn this weld.

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"The more important elements in stubbing drill collars with arc-welding methods are the welding techniques, the preheat, the stress relief after welding, and the design of the weld rather than the welding rod as long as a high-quality rod is used."

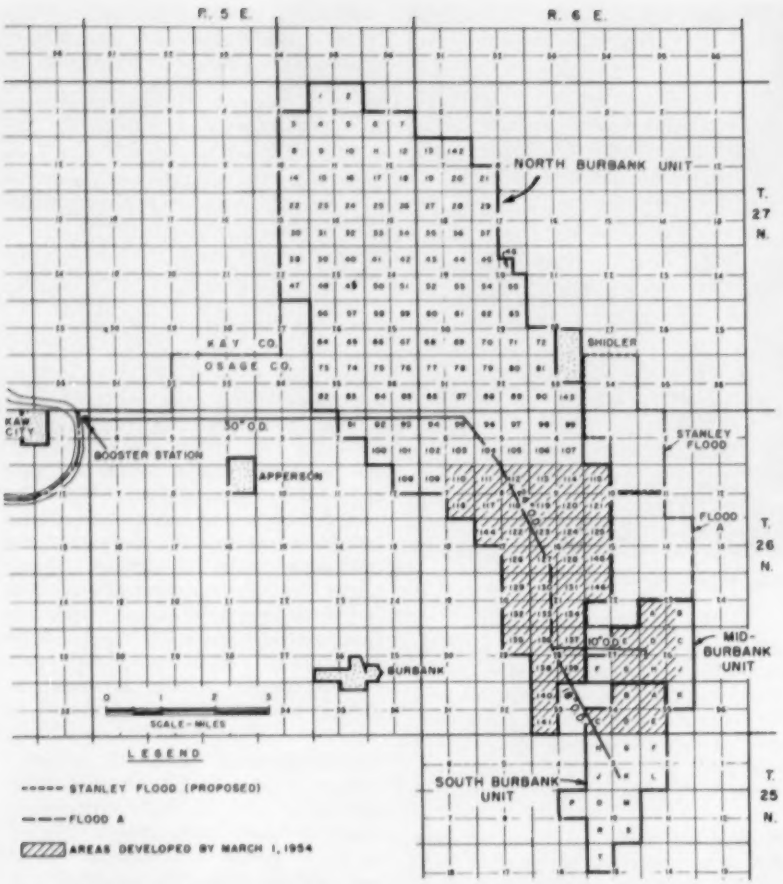

Fig. 1—Burbank area, Osage County, Oklahoma, showing the location of water-flood units and the water-supply system, March 1954.

OKLAHOMA'S LARGEST . . .

Burbank Floods Promise 180 Million Barrels of Oil

by C. H. Riggs

THE three major Burbank floods in western Osage County are the largest water-flooding operations in Oklahoma, and are expected to yield about 180 million barrels of oil. These three major floods are North Burbank Unit, operated by Phillips Petroleum Co.; Mid-Burbank Unit, operated by Kewanee Oil Co.; and South Burbank Unit, operated by Phillips Petroleum Co. (see Fig. 1). Two smaller projects in this area, Flood A and the Stanley flood, are not described in this report.

Author is petroleum engineer, Bureau of Mines, Bartlesville, Okla.

The main distribution lines for the Ark-Burbank Water System which provides water for the floods also are shown.

Burbank field development . . . Discovery well in Burbank was completed May 14, 1920, by Marland Oil Co. This well, in 36-27n-5e, was completed in the Burbank sand at 2,900 ft., and initial production was 680 bbl. of oil daily. Development proceeded rapidly during the next few years, and production reached a peak in July 1923 when 89,000 bbl. of oil was produced daily.

Drilling in the South Burbank and Stanley stringer areas followed developments in the main Burbank field. The greater Burbank area now includes about 25,000 oil-productive acres in Osage County, and nearly 2,000 oil-productive acres in Kay County.

The Burbank sand is 50 to 80 ft. thick. The lower 50 ft. generally is a pure fine-grained sand with calcareous cementing material, 25 to 40 ft. of which is oil productive in three or four separated zones.

Since water-flood development began, many additional wells have been drilled and logged by modern methods, and many cores have been cut and analyzed.

Cores taken by Phillips Petroleum Co. during the development of the North Burbank Unit showed fractured shales overlying the main sand body. Two wells were cored through the entire shale section below the Oswego limestone, and several through the sandy shales above the oil sand. The fractures, which appear to be vertical with smooth surfaces, often permitted escape of rotary drilling fluids during drilling operations. Cores from 35 wells in the developed area of the water flood of the North Burbank Unit show the main Burbank sand to be interspersed with thin shale partings. Permeability of the sand varies from virtually nothing to 300 md., and highly permeable zones cannot be correlated between wells.

Because of the lenticular character, little water has encroached upon the oil-producing sand except in those areas where it immediately overlies the Mississippian limestones. As an isolated sand body fairly homogeneous in character and without benefit of structure or natural water drive, the Burbank sand was assumed to be particularly suited to oil production by water-flooding methods.

Ark-Burbank water system . . . The Ark-Burbank water system was developed to provide flood water for these large-scale operations. Seven wells 56 to 59 ft. deep, 20 in. in diameter, each capable of producing 30,000 bbl. of water daily, were drilled into gravel beds underlying the Arkansas River near Kaw City, Okla.

The wells are pumped with two-stage turbine pumps powered by 35-hp. single-cylinder gas engines. Speed of several of the pumps is varied by a float in a 44,000-bbl. storage tank to provide a constant reserve of 30,000 bbl. of water. Provision is made for bypassing the supply tanks for semi-annual inspection and cleaning.

As produced from the wells, river water contains almost no solids but includes large quantities of sulfate-reduc-

ing bacteria. Unless killed, these bacteria act on the sulfates to release hydrogen sulfide. Hydrogen sulfide attacks iron pipe and equipment and dissolves iron to form finely divided insoluble iron sulfide that plugs the injection wells.

Originally formaldehyde was used as a bactericide, but subsequent tests showed that it was ineffective. Most of the bacteria are resistant to 50 p.p.m. of chlorine. Now quaternary ammonium compounds and chlorine are used to kill bacteria. The quaternary ammonium compounds are injected at the base of the storage tanks in amounts automatically controlled at 6 p.p.m. by the volume of water pumped to the field. About 20 to 22 lb. of chlorine are injected daily at the pumps to kill certain bacteria that are resistant to the ammonium compounds. Periodically, samples of water are taken in sterile bottles at the plant and at stations along the line to the field. The quantity and type of the water treatment are governed by the results of microscopic examinations of these water samples.

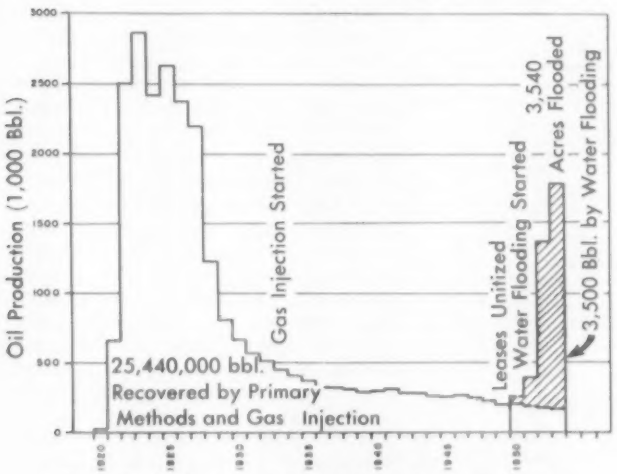

Fig. 3—Production history of North Burbank unit, 1920-1954.

Four two-stage, 1,900-r.p.m. centrifugal pumps, each capable of delivering 70,000 bbl. of water daily at a pressure of 215 psi., pump water to the field. Each pump is driven through speed-increasing gears by a 400-hp. V-type, six-cylinder gas engine operating at 425 r.p.m. Speed of the engines and pumps is automatically regulated by pressure in the field transmission line. Only one pump and engine now are being used to deliver 60,000 bbl. of water daily to the developed floods.

All motor and valve controls are automatic and are equipped with alarms and automatic shutoffs. Flow to the field is metered through a short venturi tube in the 30-in. line.

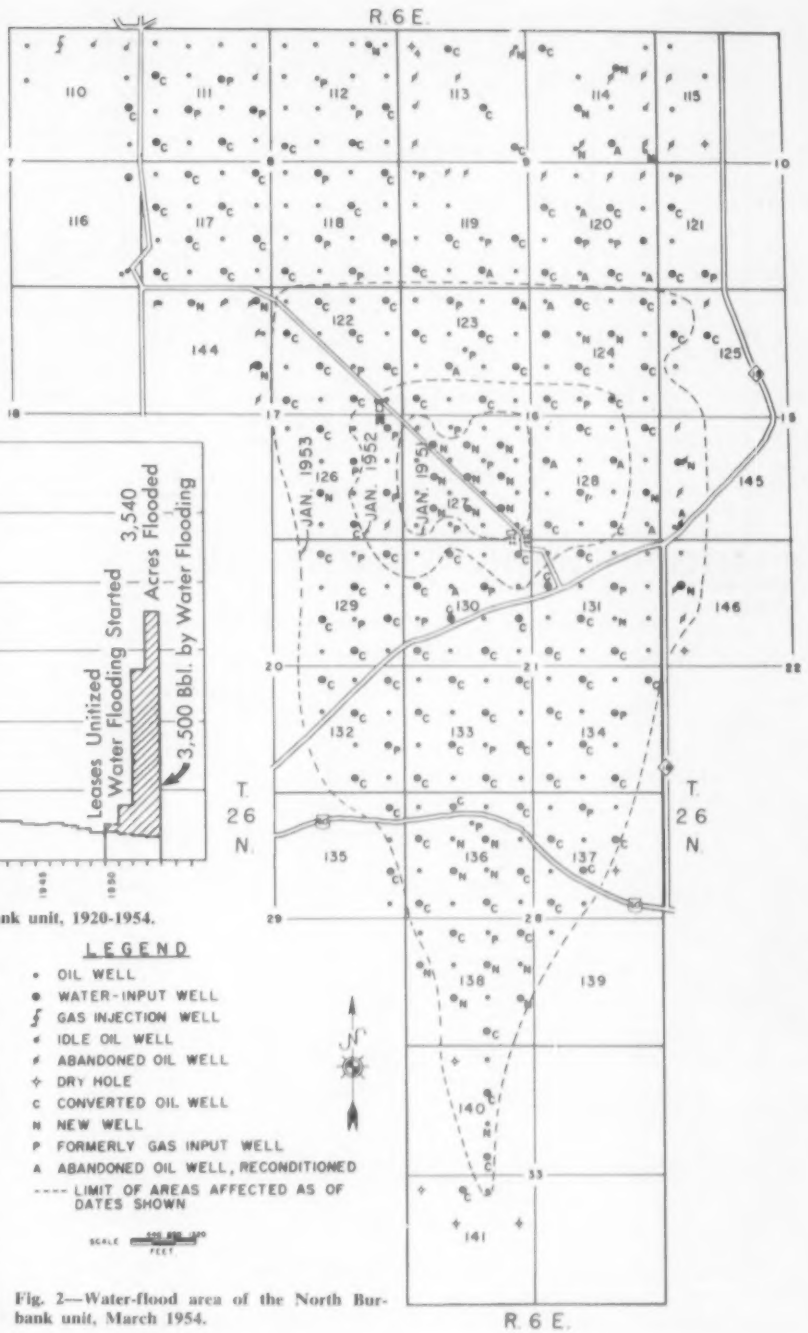

Fig. 2—Water-flood area of the North Burbank unit, March 1954.

North Burbank Unit

Pilot flood . . . Water-flooding operations in the North Burbank Unit began with a 160-acre pilot operation on Block 127 in SE SE 16-26n-6e. Oil recovery from this quarter section by primary-production methods and gas injection was 10,400 bbl. per acre.

Late in 1949 and early in 1950, nine new water input wells were drilled 660 ft. apart in the center of squares between the original oil producers, thus forming 10-acre, five-spot patterns. The three gas-injection wells were reconverted to oil-producing wells.

The new input wells were drilled with rotary rigs. About 400 ft. of surface pipe was set and cemented with 50 to 100 sacks of cement, and 5½ or 7-in. casing was set on top of or a few feet into the Burbank sand. The casing was cemented with from 50 to 100 sacks of cement.

Analyses of cores from these nine input wells showed porosity of the sand to average about 15 per cent, and hori-

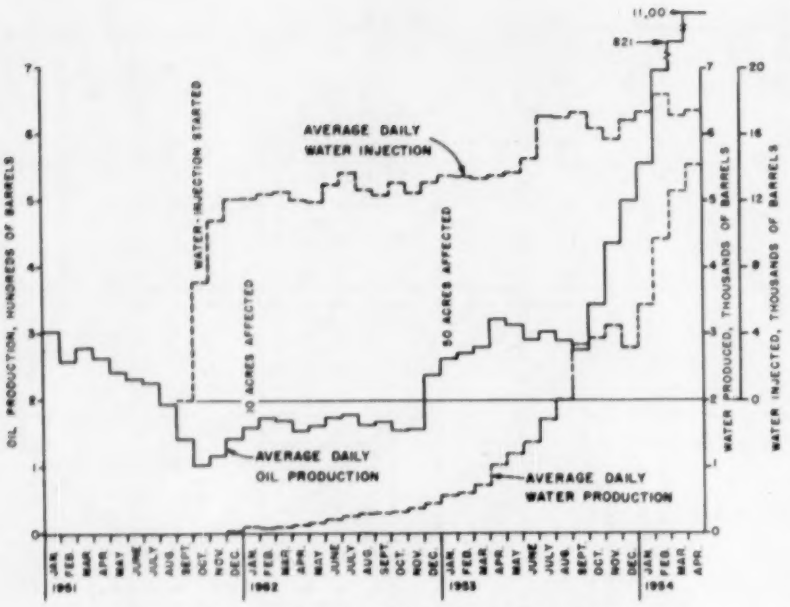

Fig. 4—Production history of Mid-Burbank unit water flood.

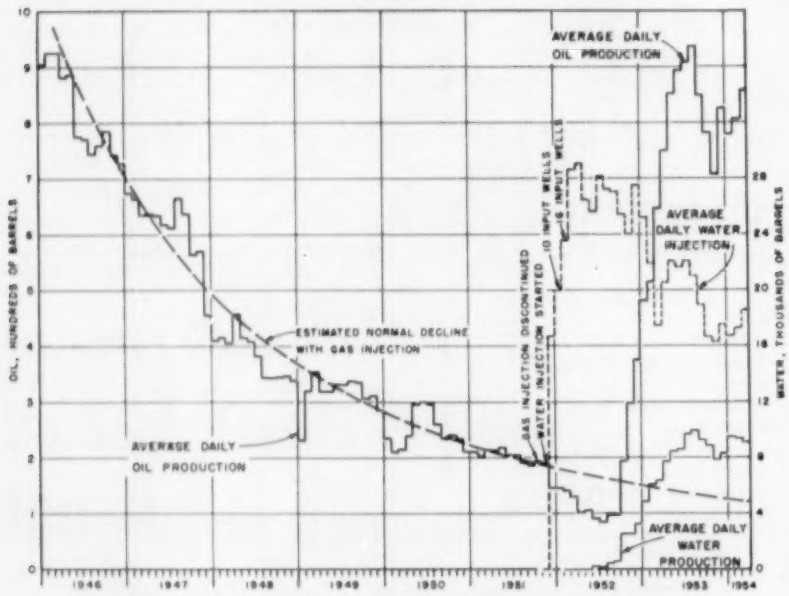

Fig. 5—Production and water-injection history of South Burbank unit water flood.

zontal permeability to range from 0 to 424 md. Three horizontal plugs cut from one 4½-in.-diameter core showed variations in permeability as great as 300 per cent between adjacent pieces. Input-profile tests run on these wells early in 1950 showed the wells to take volumes of water as great as 540 bbl. daily at sand-face pressures from 140 to 475 psi. Generally, the water entered the sand at points corresponding more with vertical fractures in the cores than with measured horizontal permeabilities.

Water injection into the nine wells was started in February 1950, at the rate of about 4,000 bbl. daily. The rate was steadily increased to 9,400 bbl. daily early in 1951, but later in the year the rate was cut back to about 4,000 bbl. daily.

When water injection was started, about 40 bbl. of oil daily was being produced from the property. The first increase in the rate of production was noted in September 1950, when daily oil production increased rapidly to 240 bbl. The rate of oil production reached a peak of 877 bbl. daily in January 1951. By February 1, 1954, a total of 602,000 bbl. of oil had been produced from this property since water flooding was started. This volume is equivalent to about 3,800 bbl. per acre, or 36 per cent of the oil produced by both primary methods and gas injection. At that time, about 95 per cent of the total fluid produced was water.

1951 Extension of North Burbank Flood

Early in 1951, the flood was extended to include eight surrounding tracts by converting alternate 10-acre-spaced oil wells to water-input wells. The input wells are 930 ft. apart in rows running diagonally northeast - southwest and northwest-southeast, forming 20-acre, five-spot patterns.

In converting former oil wells to water-input wells, the liner and 7-in. casing were pulled and the old shot holes were filled with gravel and capped with calseal. Gamma-ray and caliper logs were run in many of the old holes to determine the position of the casing, liner, and the producing zones.

Caliper logs showed holes as large as 30 in. in diameter which had been made by original shots of 80 to 100 qt. of nitroglycerin. A string of 4½ or 5½-in. casing was set at the top of the Burbank sand and cemented with about 100 sacks of cement. The calseal and gravel was then cleaned out to the total depth. In reconditioning old oil wells for continued use in the water flood, the 2-in. tubing was replaced with 2½ or 3-in. tubing.

Sometimes casing and liners were pulled and new casing reset in the top of the Burbank sand and cemented with about 50 sacks of cement. Ten former gas-injection wells were converted to oil wells, and seven were used as water-input wells.

1952 and later extensions . . . An accompanying map shows the area of the North Burbank flood developed as of January 1954 and the approximate limits of the areas affected by water flooding as of January 1951, January 1952, and January 1953. As now developed, the flood includes 35 quarter sections in Township 26n-6e.

The development of the project continued to 1954 at the rate of about 1,000 acres per year. Alternate wells were converted to water-input wells, and a few new wells were drilled where necessary to complete the pattern.

In later wells the shot hole was filled with viscous mud instead of with gravel before the production string of casing was cemented.

Water and injection equipment . . . Usually one injection pump-station and a production-tank battery are grouped

for each four blocks constituting one section. Supply water from the Ark-Burbank system is mixed with produced water at the injection pumps. Produced water separated from oil with the aid of chemicals in horizontal heater-treaters is treated with sodium tetrachlorophenate in the amount of 12 p.p.m. The sodium tetrachlorophenate is used as a bactericide in the produced water, instead of the quaternary ammonium compounds which are ineffective in the presence of an oil film.

Water-injection pumps are three-cylinder horizontal type with solid-porcelain plungers; they are powered by single-cylinder horizontal engines. Injection lines from some pump stations are tied together to provide greater flexibility of operation. The injection pressures on individual wells vary from several inches of vacuum on recently developed tracts to about 600 psi. on older tracts.

The volume of water injected into the various wells reached a peak of 128,000 bbl. daily in July 1953, and since then has been decreased about 50,000 bbl.

Results of water flooding . . . A comparison between expected and actual yearly oil production from the entire 146 blocks in the North Burbank Unit is shown below.

Year	Expected by continuation of gas injection	Actual production
1950	1,478,000	1,526,000
1951	1,387,000	1,763,000
1952	1,299,000	2,546,000
1953	1,226,000	2,758,000

An accompanying chart shows the yearly oil-production history of the 35 tracts now included in the flood from 1920, when the first oil was produced, through 1953. The rate of oil production from these tracts reached a peak of 2,513,000 bbl. in 1922 and, with the exception of slight increases during the 1930's as the result of gas injection, it declined until the first stimulation by water flooding in 1950. These properties were producing about 204,000 bbl. of oil per year in 1949 when the property was unitized. It is estimated that the total oil production from these tracts by primary-production methods and by gas injection was approximately 25,440,000 bbl. and that since water flooding was initiated, approximately 4,000,000 bbl. has been recovered.

Mid-Burbank Unit

The Mid-Burbank Unit, operated by Kewanee Oil Co., includes 635 developed acres on 10 quarter-section tracts, A to K, in Sections 23, 26, 27, and 35-26n-6e. This area of the Stanley stringer was developed in 1934 and 1936 as a north extension to South Burbank field. Eight oil and two or three gas-injection wells were drilled 660 ft. apart through the center of each quarter-section tract, but wells on edge locations were not drilled. The property has been subjected to gas injection from the start.

The annual oil production from these tracts reached a peak of about 975,000 bbl. during 1937 and had declined to 75,000 bbl. by 1951. More than 6 million bbl. of oil, equivalent to 6,960 bbl. per acre, was produced by primary-production and gas-injection methods. Gas injection was discontinued in 1951, and water injection was started on August 28 of that year.

TABLE 1
Progressive Development of North Burbank Unit Water Flood

	Jan. 1951	Jan. 1954
Developed area, acres	90	3,540
Stimulated area, acres	80	3,280
Producing oil wells (developed area)	16	197
Old oil wells	14	154
Newly drilled wells	0	17
Converted gas-injection wells	2	19
Reopened abandoned wells	0	7
Active water-input wells	9	166
Converted oil wells	0	114
Newly drilled wells	9	24
Converted gas-injection wells	0	19
Reopened abandoned wells	0	9
Average daily oil production, bbl.	877	3,913
Cumulative since injection, bbl.	95,431	3,676,879
Average daily flood-oil production, bbl.	837	3,113
Cumulative since injection, bbl.	90,473	3,546,681
Average daily water production, bbl.	1,423	35,326
Average daily water injected, bbl.	9,670	68,350
Supply-water injected, bbl.	6,185	31,689
Produced water injected, bbl.	3,485	36,671
Cumulative water injected, M. bbl.	2,389	80,092
Average injection pressure, psi.	0	575

Injection started February 1950—First increase September 1950.

Wells in the Mid-Burbank Unit produce oil from the Burbank sand, which averages 50 ft. in thickness and is about ½ mile wide. In the structurally highest area along the east side (above —1,700 ft.), 10 or 15 ft. of the sand was gas saturated originally. Core analyses show wide variations in permeability between different zones in the same well (between 0 and 32 md.), and a similar range in permeability in the same zones in different wells.

Well-Completion Methods

New wells were drilled to the top of the Burbank sand with rotary tools. A string of 5½-in. casing was set and cemented just above the actual pay zone as determined by structural position, electric log, and core analyses. Wells were drilled into the sand with a cable-tool core drill. No input wells have been reworked since water injection started, but it was necessary to recement one of the oil wells which has shown a high percentage of water production. A second oil well now is being prepared for a squeeze-cement job. A water-entry survey indicated that water is entering in the middle of the sand that gamma-ray and driller's logs showed to be "clean" sand.

Operating practices . . . River water from the Ark-Burbank system is delivered to the Mid-Burbank Unit through a 10-in. line at an average pressure of about 100 psi., although the line pressure fluctuates widely as a result of operational changes on the North Burbank Unit. The pressure is reduced to about 50 psi. by a regulator, and water then passes through two 10-ft. sand filters to remove any iron sulfide or pipe scale. The filters are backwashed once every 3 months.

Produced water passes to two other 10-ft. filters, one of which is filled with sand and gravel and the other with crushed anthracite coal. These filters are backwashed once every 2 or 3 weeks. Two 1,000-bbl. tanks serve alternately as source water for backwashing and to receive the backwash material. Sediment from the backwash tank is drained into an open pit.

River water and produced water are not injected into the same wells, although the type of water injected into several input wells has been changed, depending upon the pressure required. Most wells take water by gravity, but some pressure is required to deliver water to those wells that are topographically higher. Because more line pressure is available on the fresh than on the produced-water line, higher input wells are connected to the fresh-water line. Two parallel 4-in. trunk lines transmit water from filters to field headers.

Producing wells are pumped with individual jacks, operating with a 54-in. stroke and at 17 s.p.m. Units are powered by 16 or 25-hp. electric motors, depending upon the total quantity of lifted fluid.

Produced oil and water flow together through 4-in. lines to a 10 by 28-ft. heater-treater maintained at about 120° F. Chemicals injected at the

heater-treater help separate the oil and water. Produced oil passes to six 1,000-bbl. welded-steel stock tanks.

Aluminum electrical-transmission lines have been constructed to provide 480-volt electric current for a possible 40 producing wells. Lightning arrestors and load capacitors are provided at each pumping well.

To aid production and injection operations, a central header assembly consisting of five vertically arranged chambers was installed. This compact header permits easy access to all valves and meters. The entire assembly is housed in a circular building.

Results of water flooding . . . The oil and water-production history of the Mid-Burbank Unit is shown graphically in an accompanying chart. The daily oil production decreased perceptibly in September 1951 as a result of the discontinuance of gas injection. The first production increase attributable to water flooding occurred in May 1952. Table 2 is a summary of operations and results on the Mid-Burbank Unit flood as of January 31 for each of the years 1952, 1953, and 1954. By April 1954, approximately 1,100 bbl. of oil and 5,500 bbl. of water daily were being produced as a result of the injection of 12,000 bbl. of river water and 5,500 bbl. of salt water. The 17,500 bbl. of water injected daily through 37 input wells amounts to about 475 bbl. per input well as compared with nearly 1,000 bbl. per input well for the peak rate of injection on the North Burbank Unit. The increased oil recovery attributable to water flooding is approximately 153,000 bbl., or about 235 bbl. per acre.

Because the sand is not filling up as expected, input-profile and water-tracer tests are being run on several input wells. Some wells have been squeeze-cemented where the original workover was not successful.

South Burbank Unit

The discovery well in South Burbank field was completed January 1934, at a depth of about 2,700 ft. In the subsequent development of the field, eight wells were drilled on each quarter section in a staggered pattern, two or three of which were completed as gas-injection wells.

Well-completion methods . . . The original oil wells, drilled in the 1930's, were completed with 5½-in. casing set and cemented near the top of the Burbank sand. In reconditioning these wells for water flooding, gamma-ray logs were run to determine the exact position of the casing, liner, and oil sand. It was not necessary to alter the casing in most wells, but liners were recemented in two converted for use as input wells.

The four new input wells, drilled with rotary tools, were cored and electrically logged. In each, a string of 4½-in. casing was set and cemented about 1 ft. below the top of the Burbank oil sand as determined from electric logs.

Water treatment . . . Water from the Ark-Burbank system enters the South Burbank Unit at a field header where it is distributed without treatment to about half of the input wells. Produced oil and water is separated in three 8 by 22-ft. horizontal heater-treaters which are not fired. Emulsion-breaking chemical, diluted with equal parts of kerosine and xyolene, injected at the header, aids the oil and water separation.

TABLE 2
Summary of Development and Operations, Mid-Burbank Unit Water Flood

	Jan. 1954
Developed area, acres	650
Stimulated area, acres	332
Producing oil wells (developed area)	41
Old oil wells	29
Newly drilled wells	11
Converted gas-injection wells	1
Reopened abandoned wells	0
Active water-input wells	37
Converted oil wells	15
Newly drilled wells	18
Converted gas-injection wells	4
Reopened abandoned wells	0
Average daily oil production, bbl.	556
Cumulative since injection, bbl.	257,831
Average daily flood-oil production, bbl.	464
Cumulative since injection, bbl.	90,195
Average daily water production, bbl.	3,441
Average daily water injected, bbl.	17,332
Supply-water injected, bbl.	13,891
Produced-water injected, bbl.	3,441
Cumulative water injected, M. bbl.	11,633
Average injection pressure, psi.	0-50

Injection started October 1951—First increase April 1952.

Roughly 12 p.p.m. of sodium tetrachlorophenate is added to the produced water in the heater-treater. Produced water from the heater-treaters passes to four 12-ft. closed-type filters containing graded anthracite coal on a sand bed. Only two of the filters are in regular use while the other two are being backwashed once each day. The filtered produced water goes to a header where it is distributed through 3-in., lightweight steel pipe to about half of the input wells.

Selection of wells to be connected to each of the two water-distribution systems is made arbitrarily, and periodically each system is used for fresh water while other is used for brine so that any salts which are deposited by the brine will be redissolved by the fresh water.

Results of water flooding . . . The rate of oil production declined sharply late in 1951 with the discontinuance of gas injection and the initiation of water flooding. The first increase in the rate of oil production was noted in July 1952, and by December of that year three wells had shown increases in daily oil production totaling 162 bbl. A peak rate of 930 bbl. daily was reached in August 1953, and by March 1954, the rate of oil production had declined to about 700 bbl. daily. The rate of water production began to increase in July 1952, together with the increase in oil production. Between April 1953 and February 1954, the rate of water production was more or less constant at 8,000 to 9,000 bbl. daily. The produced water-oil ratio has remained nearly constant since the first increase in produced fluid, indicating channeling between injection and producing wells. On March 15, 1954, the 19 oil wells on the South Burbank Unit flood were producing about 700 bbl. of oil and 9,000 bbl. of water daily. It is too early to predict total recovery from these five quarter-section blocks, but total recovery will depend to a large extent upon the elimination of channeling and bypassing. Table 3 gives significant data on the operation as of January 1, 1952, 1953, and 1954.

TABLE 3
Progressive Development of South Burbank Unit Water Flood

	Jan. 1954
Developed area, acres	635
Stimulated area, acres	561
Producing oil wells (developed area)	19
Old oil wells	17
Newly drilled wells	0
Converted gas-injection wells	2
Reopened abandoned wells	0
Active water-input wells	16
Converted oil wells	5
Newly drilled wells	3
Converted gas-injection wells	8
Reopened abandoned wells	0
Average daily production, bbl.	778
Cumulative since injection, bbl.	344,857
Average daily flood-oil production, bbl.	653
Cumulative since injection, bbl.	279,018
Average daily water production, bbl.	9,054
Average daily water injected, bbl.	16,766
Supply-water injected, bbl.	8,482
Produced-water injected, bbl.	8,284
Cumulative water injected, M. bbl.	17,962
Average injection pressure, psi.	Vac.

Injection started November 1951—First increase August 1952.

Salt-Dome Geology May Enter New Phase

. . . as a result of overthrust discoveries at South Boling

PART OF TEXAS GULF COAST showing location of South Boling oil field. Fig. 1.

by Michel T. Halbouty and George C. Hardin, Jr.

SOUTH BOLING oil field is structurally a closure on the downthrown side of a thrust fault occurring on the south flank of the Boling piercement-type salt dome, Wharton County, Texas.

This field is 1½ miles southeast of Boling, Tex., and about 50 miles southwest of Houston (Fig. 1). The field is situated in the Frio trend of the upper Gulf Coast of Texas and is approximately on strike with such prolific Frio-formation oil fields as Friendswood, Hastings, Magnet-Withers, and West Ranch.

The significance of South Boling oil field is neither in the thick, productive Frio sands found nor in the millions of barrels of oil reserves proved, but in the unique controlling structural feature for the accumulation, and in the fact that many such fields may have been heretofore overlooked by the use of the conventional Gulf Coast geologic approach. If the fourth well in the field had been drilled first, it would have penetrated the older overthrust body of Jackson (Eocene) shale and would have been abandoned before reaching a depth sufficient to test the younger but underlying Frio sands.

Some geologists in the Gulf Coast are of the opinion that thrust faulting in the incompetent Tertiary sediments of the Gulf Coastal Plain is impossible.

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. . . Now—the Fourth Stage of Advancement

Exploration for gas and oil on piercement-type salt domes in the Texas and Louisiana Gulf Coastal Plain has heretofore been marked by three stages of advancement: (1) the discovery of oil from the caprock at Spindletop in 1901; (2) the discovery of the prolific flank producing reservoir at Spindletop in 1925; and (3) the penetration of the caprock salt overhang at Barber's Hill in 1930.

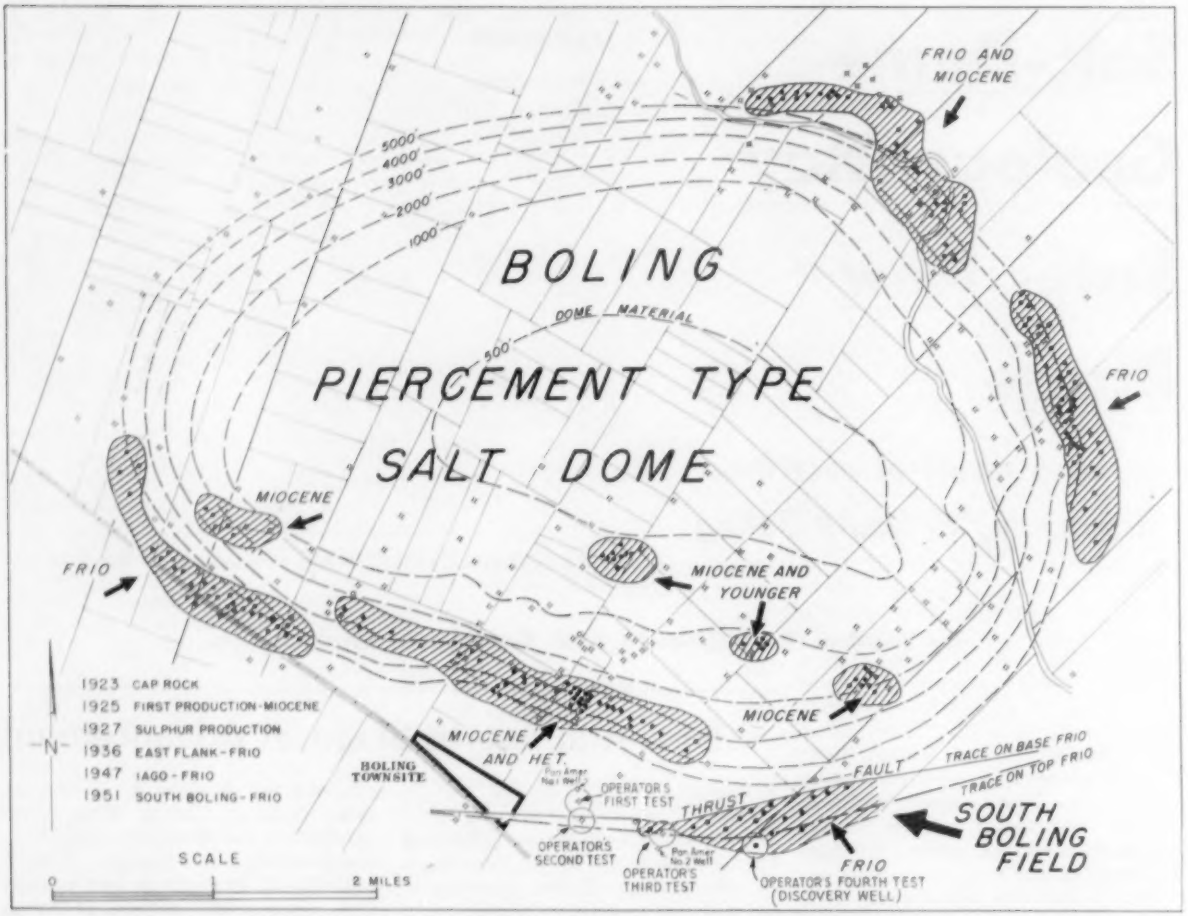
The successive occurrence of each of these events resulted in a definite advance in exploration technique and in geological thinking, which in turn led to the discovery of important new reserves on salt domes. There has been no other real single exploration advance in salt-dome geology in the Gulf Coastal area since the penetration of the caprock-salt overhang at Barber's Hill in 1930. However, in March of 1952, a fourth significant advance in salt-dome geology in the Texas-Louisiana Gulf Coast resulted from drilling on the south flank of the Boling salt dome, Wharton County, Texas, when penetration was made through a Jackson (Eocene) shale section of as much as 1,000 ft. in thickness into younger Frio sands (upper section of Lower Oligocene). The presence of multiple, thick, highly permeable and porous Frio oil sands underneath this great thickness of older Jackson shale revealed the existence of a thrust fault, a heretofore unrecognized Gulf Coastal geological condition.

The fact that such a geological feature does exist at Boling is of the utmost importance in that identical situations probably exist on other salt domes, and the so-called shale "wedges" which have plagued operators for many years may be overthrust bodies of shale with many productive sands underneath yet to be penetrated. The Boling thrust fault may open many thousands of so-called condemned acres on piercement-type salt-dome flanks for re-exploration.

When a report* was published in 1945, describing a thrust fault in the Cretaceous beds on the south flank of the Leedo dome, Jefferson County, Mississippi, little attention was given to this structural feature by Texas and Louisiana Gulf Coast geologists because all admitted that thrust faulting could be expected in the more competent Cretaceous formations. The Leedo-dome thrust fault did not alter conventional thinking with regard to such an occurrence in the unconsolidated sediments of the Gulf Coastal Plain.

*C. W. Alexander, C. L. Morgan, and M. E. Norman, Developments in Southeastern States 1944, Bull. Amer. Assoc. Petrol. Geol., Vol. 29, No. 6 (June 1945), p. 830.

Initial work . . . Exploration for oil



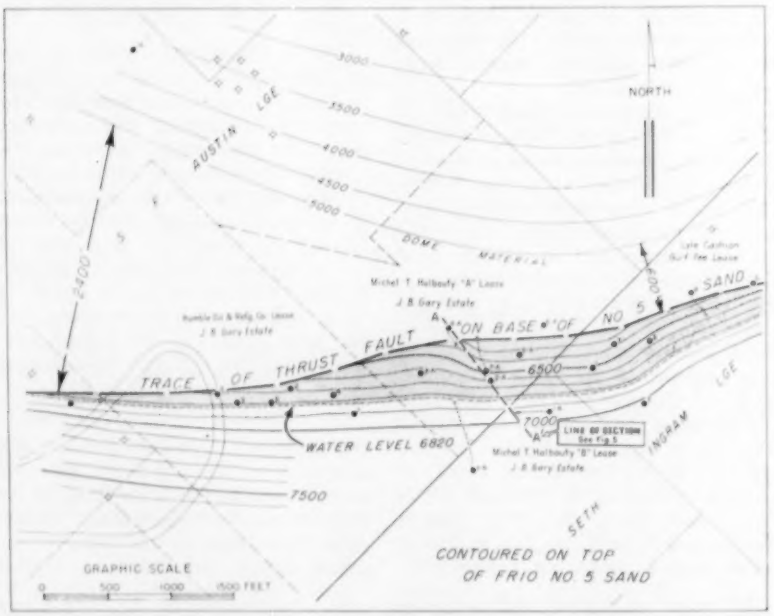
BOLING PIERCEMENT-TYPE SALT DOME showing areas of production and location of South Boling field in relation to salt dome. Fig. 2.

on the south flank of the Boling dome was initiated on the basis of conventional salt-dome geology. Between two previously drilled dry holes existed a definite pinchout of more than 983 ft. of Frio section which, conventionally, afforded good standard salt-dome geology for the occurrence of oil in the pinched-out Frio sands.

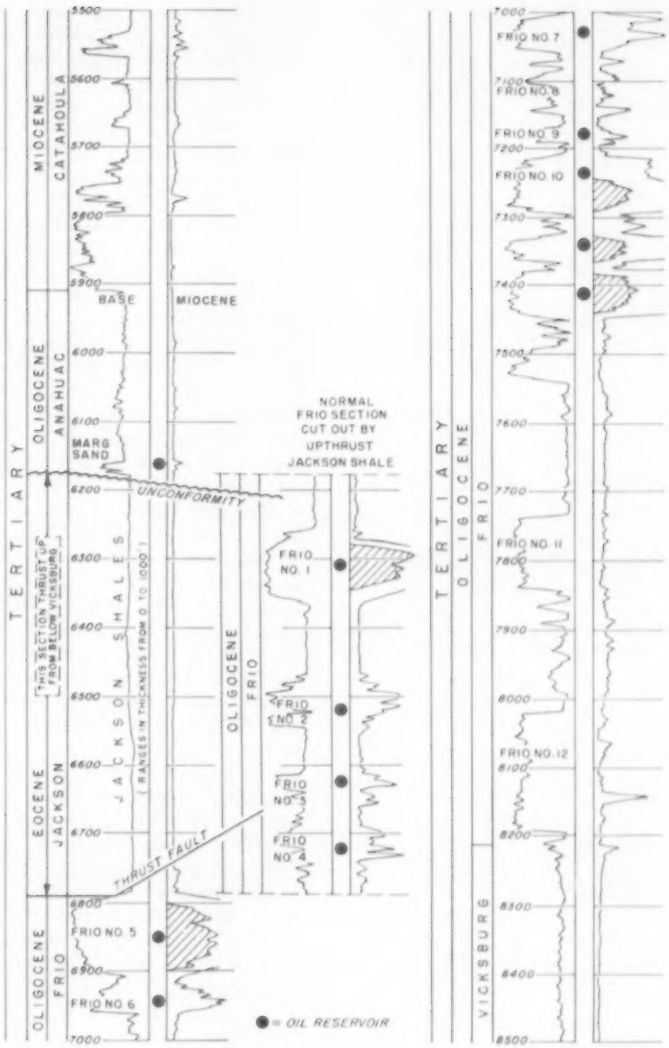
The first of four exploratory wells (Fig. 2), was located down-structure from 1 Pan American, an earlier failure, with the hope of penetrating the Frio sands down-structure from the known pinchout. This well was drilled to 6,218 ft. and penetrated Vicksburg shale below the Marginulina zone in the same sequence as 1 Pan American.

The second well, drilled to 6,455 ft. (Fig. 2), was located down-structure from the first well, and the results were similar to those of the first well, with the exception that in addition to Vicksburg fauna, Jackson forams were detected in the shale section below the Marginulina zone.

Since no Frio sands were found in the two wells, it was decided to move



SOUTH BOLING FIELD contoured on top of Frio No. 5 sand. All depths are from surface datum 85 ft. above sea level. Fig. 3.



COMPOSITE ELECTRIC LOG of South Boling field. Log at left shows stratigraphic section as found in wells that penetrate overthrust shale wedge; log in center shows normal section as found in unfaulted wells. All depths are from surface datum 85 ft. above sea level. Fig. 4.

up-structure from 2 Pan American, which had 983 ft. of Frio section, for the third test well. The third test penetrated a good Frio section from 6,570 ft. to the total depth of 8,532 ft.; some oil shows were detected and logged but no productive sands were found. Although the Frio sands were penetrated at approximately their known up-structure limit in the third well and found to contain salt water, the prospect was still considered to be worthwhile for further exploration because of the possibility that this well may have been located in an area where there was no lateral closure on the Frio sands. The fourth test was located farther east because it appeared that the Frio would be much higher structurally in that direction, and that better possibilities for lateral closure would exist.

Discovery well . . . The fourth test, Michel T. Halbouty's 1-A Gary, drilled to 7,213 ft. (Fig. 3), penetrated 500 ft. of Frio section with all sands containing salt water. It was decided to side-track the well toward the dome 500 ft. horizontally with the hope of finding the Frio sands sufficiently high enough on the flank of the dome to contain oil. This was done and the South Boling field was discovered. The top of the first Frio sand was found at 6,410 ft. and oil saturation extended to 6,820 ft.† This well was completed from perforations at 6,834-40 ft. (corrected vertical depth, 6,764-70 ft.) opposite the Frio No. 4 sand and flowed 169 bbl. of 26.4°-gravity pipeline oil with a flowing tubing pressure of 880 psi. on a 9/64-in. choke.

The next two tests confirmed production (Fig. 3 shows location of wells 1-B and 2-A), and the geology was as anticipated. It is most significant that Jackson forams were reported‡ below the Marginulina zone and above the Frio sands in the 2-A well. This bit of information was interpreted by the operator to be the result of reworked forams in the Frio shales, because the Frio sands shown on the electric log were correlative with the Frio sands in the normal 1-A and 1-B wells. Since the well was already down to its projected depth and the oil sands had been logged when the report about the Jackson forams was made, it was logical to assume that the theory of reworked fossils was correct. This was the easiest and simplest explanation for an unusual fact.

A development program was planned, and the 3-A Gary was located for drilling (Fig. 3). During the drilling of this well (the operator's 3-A), the

†All depths used in this paper are with reference to a surface datum 85 ft. above sea-level.

‡Jack Colle, consulting paleontologist, Houston, who was retained for micropaleontological determinations.

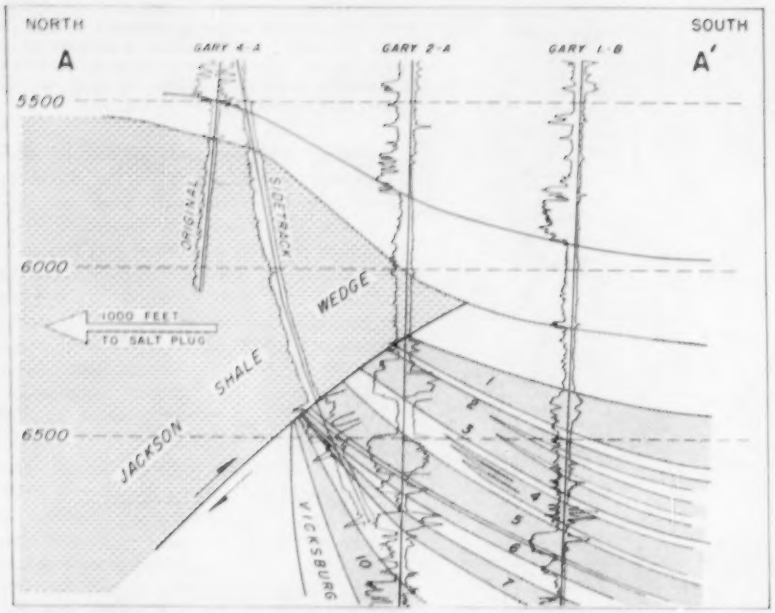
THE AUTHORS

Michel T. Halbouty is consulting geologist and petroleum engineer of Houston. He is a graduate of Texas A. & M. College and began his professional career as junior geologist for Yount-Lee Oil Co. in 1931. Later he was associated with Glenn H. McCarthy as chief geologist and petroleum engineer. He entered the consulting field in 1937. He is an authority on salt-dome geology, and oil occurrence in the Texas Gulf Coast. He is widely known as a co-author of the recent book, "Spindletop."

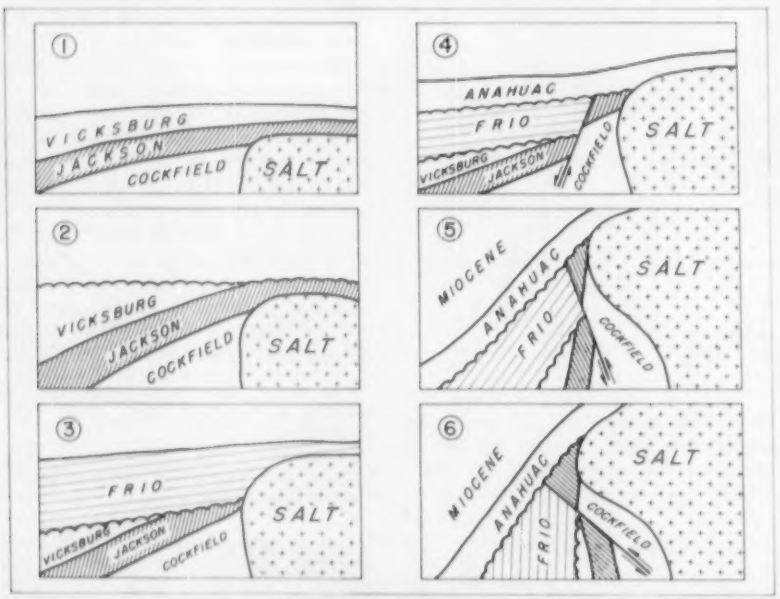
George C. Hardin, Jr., is geologist and petroleum engineer associated with Michel T. Halbouty. He is also a graduate of Texas A. & M. and was a Van Hise fellow at University of Wisconsin. He was formerly with Victory Fluorspar Co., the U. S. Geological Survey, and Carter-Gragg Oil Co. His specialization lies in the fields of sedimentation and subsurface geology.

M. T. HOLBOUTY

G. C. HARDIN



CROSS-SECTION AA' through South Boling field showing relation of productive Frio sands to overthrust body of Jackson shale. Line of section is shown in Fig. 3. All depths are from surface datum 85 ft. above sea level. Fig. 5.



SEQUENCE OF CROSS-SECTIONS showing theoretical results of normal faulting with subsequent overturn of fault by rotation as intrusion of salt mass progressed. This possible interpretation for South Boling structure was ruled out because Frio beds at South Boling do not have dip as steep as would result from overturn of normal fault as shown above. Fig. 6.

Humble Oil & Refining Co. was drilling its 2 Gary on the offset lease at the west. The Halbouty 3-A was to be drilled to 6,500 ft. and an electric log was to be run. During drilling, the paleontologist again reported the presence of Jackson forams, but since the report was made just 100 ft. short of the electric-log depth, no change was made in the drilling program.

A few hours after the report of Jackson forams in the Halbouty well, Humble reported that it had penetrated approximately 600 ft. of Jackson shales and had cored the lower part of the section where Cockfield foraminifera were found. The presence of Jackson shales below the Marginulina zone was considered to be evidence enough that no Frio sands were to be found so that the normal procedure would be to abandon the well. Plans for abandoning the Humble well were made, but instructions were given to continue coring for an additional 20 ft. before running the last electric log on the well. This 20 ft. of core consisted of Frio oil sand.

Frio sand strikes . . . Below the 600 ft. of Jackson and Cockfield shales in the Humble well, a Frio section of 100 ft. containing oil was found, and below 620 ft. of Jackson shale in the Halbouty 3-A, 115 ft. of Frio sands were found containing oil. In order to be sure that the overlying shale section in the Halbouty well was Jackson in age, many side-wall cores were taken for micropaleontological determinations which proved that the shale was Jackson, and established within 10 ft. the contact of the Marginulina shale and the Jackson shale.

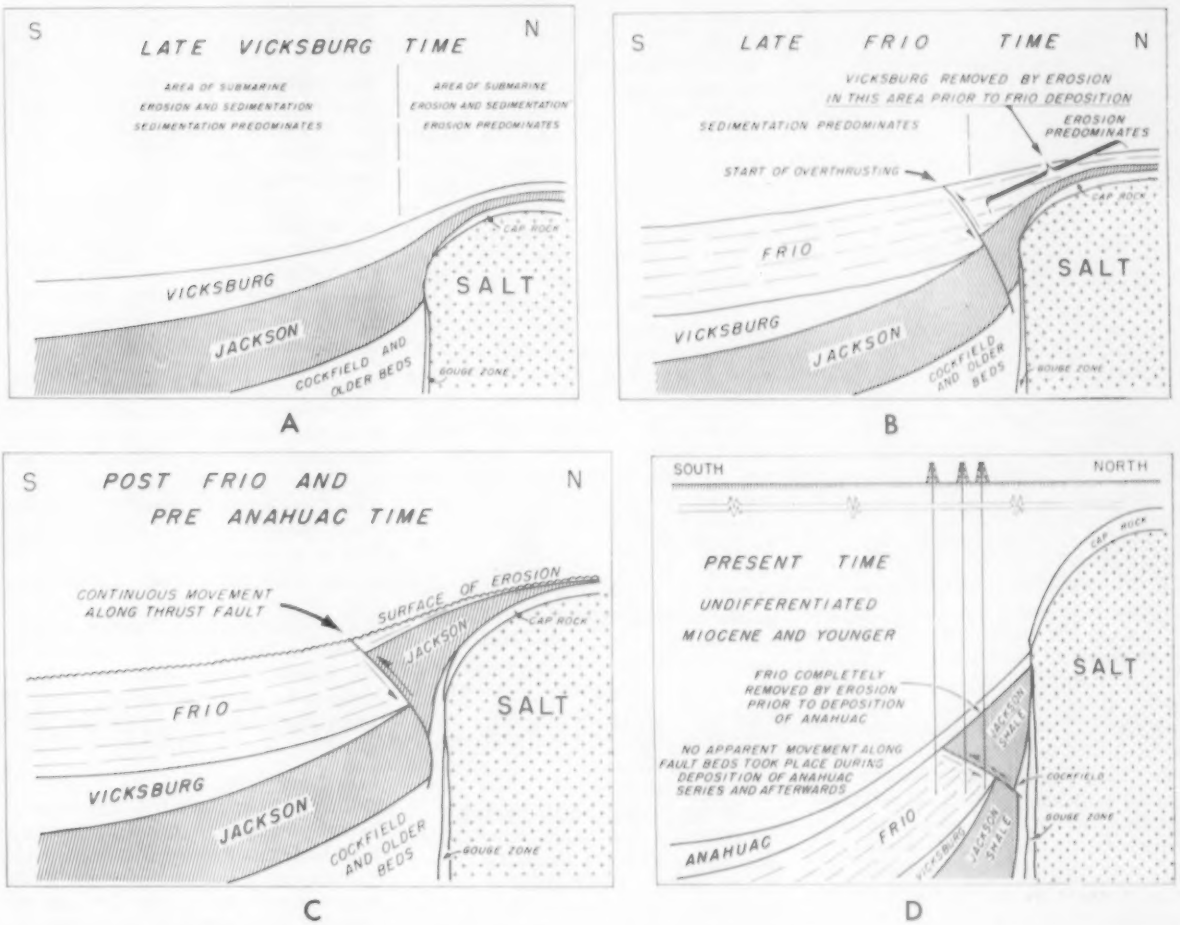
The data from these two wells changed the conception of the geology on this flank and made it obvious that an unusual structural condition was present. It was also apparent after closer study of the electric log that the so-called reworked forams in the 2-A well were really Jackson, and that the thick body of Frio sands in the well also existed below the older Jackson shales.

Continuous drilling operations by Halbouty, Humble, and later by Texas Gulf Sulfur (Lyle Cashion) were conducted with the knowledge that this exceptional, yet unexplained, geologic condition existed. Many theories were discussed by the writers in the attempt to solve the problem, and after much study it was conclusively decided that a thrust fault of more than 1,000 ft. of throw had occurred and had moved the older Jackson shales over the younger Frio beds. Although such a conclusion was contrary to the established thinking in the Coast, the facts were considered by the writers to be too strong to dispute.

Never before has such a phenomenon been reported in the Texas and Louisiana Gulf Coast province. The presence of multiple, thick, highly permeable and porous oil sands under an older overthrust formation revealed a heretofore unrecognized Gulf Coast geologic condition. If such a thrust fault occurred at Boling, it is logical to assume that it occurred on other piercement-type domes, and, therefore, this discovery may open many thousands of so-called condemned acres on piercement-type salt-dome flanks for re-exploration. It affords an entirely different slant on geological thinking in the drilling on structure of this type.

Stratigraphy

South Boling field is in the most prolific part of the Frio trend of the



SEQUENCE OF CROSS-SECTIONS showing writers' concept of formation of South Boling overthrust in connection with growth of Boling salt dome. Fig. 7.

upper Gulf Coast. The surface sediments consist of clays of the Beaumont formation of upper Pliocene age. The subsurface stratigraphy of the area in which this field is situated is normal for the trend. However, throughout most of the field proper, the overthrust "wedge" of Jackson shales lies between the Marginulina zone and the Frio sands.

The stratigraphic section shown on the composite log (Fig. 4) is typical of the beds penetrated in South Boling field. Variations in the sand sections may be seen in the cross section (Fig. 5).

The section shown on the composite log from 5,920 to 6,180 ft. is typical of the Anahuac formation, or Middle Oligocene shale. The Anahuac formation is divided into the Discorbis, Heterostegina, and Marginulina zones.

Throughout most of South Boling field, a fine-grained sand ranging in thickness from a few feet to 30 ft. is found at the base of the Marginulina zone. This sand lies above the unconformity that separates the Marginulina zone from either the underlying Jackson shales in the area affected by the overthrust, or the underlying Frio formation in the few wells that did not find Jackson shales between the Marginulina and Frio sections.

The Frio section as shown on the composite log is approximately 2,000 ft. thick and thins in a short distance up-structure as the upper sands are cut out by the thrust fault and replaced by the Jackson shale, and the lower sands thin toward the pinchout or up-structure limit. This condition is illustrated on the cross section (Fig. 5).

The Vicksburg shale underlies the Frio formation in normal sequence in this area. This formation consists of dark, brownish-gray, thinly bedded shale. The thickness of the Vicksburg in this area is not known but the vertical thickness is in excess of 2,818 ft. The Lyle Cashion 9 Gulf Fee penetrated the top of the Vicksburg at 8,190 ft. and had not reached the Jackson formation at the total depth of 11,008 ft. This well is located a short distance east of the area shown in Fig. 3. This apparently abnormal thickness probably results from the dip of the beds in this formation on the flanks of the salt dome.

The Jackson formation in this area has not been penetrated in its normal sequence below the Vicksburg, but a large part of the formation has been drilled through in the overthrust segment shown in the cross section (Fig. 5).

Humble's 2-B Gary cored approximately 50 ft. of Cockfield shales in normal sequence at the base of the overthrust Jackson wedge overlying the productive Frio sands. This is the only known penetration of the Cockfield formation in this area.

Structure

Structurally, South Boling field is a closure on the downthrown side of a tangential thrust fault that is apparently related to the growth of the Boling piercement-type salt dome. The relation of this thrust fault to the salt plug is shown in Figs. 2 and 3. It may be noticed that the trace of this fault on

the base of the Frio is only about 600 ft. from the 5,000-ft. salt contour near the center of the field, but extends east and west tangential to the elliptical outline of the salt mass. The eastern extent of the fault and of the resulting oil accumulation has not yet been determined by drilling.

The cross section (Fig. 5) shows the relation of oil accumulation to structure in South Boling field. The thrust fault pushed the Jackson shale up over the beds of the Frio, and the movement along this fault was completed at the end of Frio time. An erosional unconformity developed at the completion of the fault movement, and all beds younger than the Frio occur in their normal stratigraphic sequence.

Fault Plane

The base of the Jackson wedge is marked by the fault plane. Contour maps made on the base of this wedge in the overthrust block indicate this surface is essentially a slightly warped plane. In the central part of the field through which the cross section of Fig. 5 was constructed, the dip of the fault plane is 35°. The dip of the fault steepens to about 70° at the west end of its known extent near Boling Townsite (Fig. 2). The fault has not been traced sufficiently far east to determine whether or not the same condition exists in this direction. Apparently, the fault steepens to a practically vertical position as it dies out westward, and this is probably the condition toward the east.

The fault plane is slightly concave downward, and the structural position of the fault plane drops off both east and west. This condition causes the greatest width of the productive band to coincide with the greatest thickness of oil sand near the central part of the field. The southern edge of the Jackson-shale wedge (the point at which the fault plane is truncated by the post-Frio unconformity) occurs at 6,150 ft. near Halbouty's 2-A Gary in the central part of the field, but drops down to 6,600 ft. near Humble's C-1 Gary, the westernmost productive well of the field. Apparently, the same structural drop occurs on the east.

So far as the writers have been able to determine, this is the only authenticated example of thrust faulting that has been described in the Gulf Coastal Plain of Texas and Louisiana. It is probable, however, that many such structures exist in connection with the piercement-type salt domes of the Gulf Coastal Plain, but have not been recognized. In arriving at an interpretation of this unusual feature, several possible explanations were considered, but every fact points toward thrust faulting, and no other explanation satisfactorily fits the data.

It has been suggested that this structure might have originally occurred as a rather steep normal fault and that the subsequent rise of the salt mass rotated the plane of the fault in such a manner as to give it the appearance of a thrust fault. Such a sequence of events is depicted in the six illustrations shown in Fig. 6. If the structure had thus developed, the Frio beds would have been rotated in such a manner as to create a dip of 90° or more: the beds of this section would have necessarily become practically vertical, or else would have been overturned.

Such is not the case, as is demonstrated by cross section (Fig. 5). In fact, the dips on the Frio sands range from 45° to 70°. Lack of complete overturn is also proved by the fact that the Frio sections, penetrated by wells that have drilled through the Jackson shales in South Boling field, are correlative with wells drilled a considerable distance from the dome, and thereby show that the Frio section over the represented distance is in normal sequence.

The possibility of a "shale overhang" was also considered. If this were the case, the outline of the shale wedge would follow the general curvature of the salt mass. Such is not the condition, as is shown in Fig. 3 where the outline of the wedge is essentially a straight line that is approximately 600 ft. from the 5,000-ft. salt contour at the closest point, and is more than ½ mile from the same contour near the western end of the fault.

The possibility of reworked Jackson sediments being eroded from the higher parts of the dome during Frio time and redeposited with the Frio sands was considered when the Jackson was originally found out of place above the Frio. This explanation was quickly ruled out as more data became available and it became apparent that the content, shape, size, and extent of the shale wedge precluded this as a possible explanation.

The writers' concept of the formation of the overthrust in connection with the growth of the salt dome is illustrated in Fig. 7.

Reservoirs

All of the productive sands at South Boling are highly porous and permeable clean sands with excellent productivity characteristics. Eleven productive sands are known, but at this time, it cannot be definitely determined how many of these sands constitute separate reservoirs. Apparently, there is no radial faulting in the productive area which might separate the same sand into different reservoirs.

Marginulina sand . . . The Marginulina sand ranges in thickness from a very few feet to 30 ft., and is situated at the base of the Anahuac shale section directly overlying the post-Frio unconformity in this area. Throughout most of the productive part of the structure, this sand rests on the Jackson shale of the upthrust block, but south of the southern limit of this shale wedge, this sand rests on the Frio formation in normal sequence.

Frio Nos. 1, 2, and 3 sands . . . Of the Frio Nos. 1, 2, and 3 sands, only the Frio No. 1 sand is well developed, and this is the only sand of these three that has been tested for production. The Frio No. 1 sand ranges in thickness from 40 ft. to 125 ft. and consists largely of clean sand.

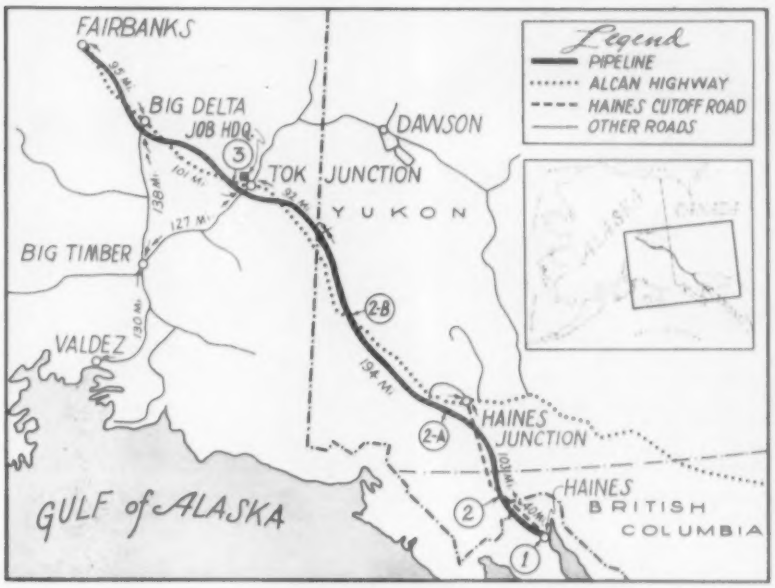
The Frio Nos. 2 and 3 sands are thin, shaly sands that are not well developed in the field. Neither of these sands has been tested for production, but electric logs and core data indicate them to be productive of oil. The oil-water contact of these two sands is not known.

Frio Nos. 4, 5, 6, 7, 8, 9, and 10 sands . . . These sands are considered together because it appears that they may be interconnected in such a manner as to constitute one reservoir. Facts that indicate this probability are the presence of a common water level at 6,810 ft., the close similarity of bottom-hole pressures in all sands, and the similarity of productive characteristics and gravity of oil. The oil from all these sands is approximately 26.5°-gravity.

Frio Nos. 11 and 12 sands . . . The Frio Nos. 11 and 12 sands are shown on the composite log. The only wells that have penetrated these sands where they could be definitely correlated have found them to contain salt water.

Based on the productive characteristics of the wells and upon the bottom-hole-pressure data available, all sands in this field appear to have a highly effective water drive. Production from the field is presently averaging about 3,000 bbl. of oil per day with no apparent decline in bottom-hole pressures.

Theoretical productivity indices were calculated for several wells. These theoretical indices range from 2.7 to 4.5. The actual productivity index has been measured only on Halbouty 2-A Gary producing from the Frio No. 7 sand; this measured productivity index was 10.2.



Route of the important Alaskan Products Pipeline which will serve defense installations near Fairbanks. The line will be in service by summer of 1955.

This crossing of Moose Creek was one of the roughest sections encountered.

Alaskan Products Artery Nears Completion

by B. E. Barnes

LINE construction on the important Alaskan products pipeline, being built as part of the country's defense establishment, has been virtually completed. The 8-in. line starts at Haines, Alaska, runs 297 miles through Canadian territory, reenters Alaska, and terminates at Fairbanks, a total of 625 miles. From the port of Haines, the line generally follows the Haines Cutoff Road to Haines Junction, Yukon, and then parallels the Alcan Highway to Fairbanks.

When the line is in operation, shipments of products to the Alaskan Command will be far less vulnerable. Products tankers which will unload at the Haines terminal will be able to remain in protected waters of the Inland Passage on the trip from West Coast ports. Also important is the fact that Haines is an ice-free port, allowing operations to continue through the winter.

The line will have five pump stations and three storage terminals and will deliver products of all types to defense installations near Big Delta and Fairbanks. It is being built for the U. S. Department of Defense by a group of construction companies, hereafter called the prime contractor, who

Author is vice president of Williams Brothers Co.

Rugged right-of-way through thawing muskeg was a general feature of the entire line. Here a ditcher gets an assist from one of the many tow tractors provided.

Tractor-mounted welding machines were a big help in speeding welding operations. Five inspection teams checked weld quality during construction.

Concrete weights, each weighing 225 lb., were cast at the station sites for use on the line.

obtained the contract under a joint bid arrangement. The companies are Williams Brothers Co., of Tulsa; McLaughlin, Inc., of Great Falls, Mont.; and Marwell Construction Co., Ltd., of Vancouver, B. C.

Pipe-laying work was done by Williams Brothers in association with McLaughlin. Clearing and grading of right-of-way was subcontracted to Oaks Construction Co., of Anchorage, Alaska.

The contract for work on the pump stations and tank farms was awarded the Marwell company; that work is in progress at the present and is to continue through the winter. That company will also build the terminal and wharf at Haines. The entire system is to be completed and turned over to the Government by September 1, 1955.

Problem in logistics . . . Construction of the line was preceded by considerable time spent in planning how to get men and material to the right place at the right time. Although most of the pipe-laying equipment originated with Williams Brothers, the pipe, made to A.P.I. 5L Grade-A specifications, was supplied by both English and American firms.

Pipe for the Canadian portion of the line was manufactured in England and shipped from Glasgow, Scotland, direct to Alaska. The first shipload was received at the port of Valdez, trucked to Tok Junction, then south along the Alcan Highway to the Alaskan-Yukon border where one main-line spread started operations. Later, as work progressed, two other ships unloaded English pipe at Haines for use in the southern portion of the Canadian section.

All pipe for the American portion was shipped from New Orleans with the first ship carrying construction equipment as well as pipe. Three shiploads of American pipe were taken to Valdez and a fourth to Haines.

Poor road conditions on the southern part of the line made it necessary to haul all equipment and material for the northern portion of the Canadian section through Tok Junction and along the Alcan Highway to the kickoff point. Although the line section from Haines north parallels the Haines Cutoff Road, no attempt is made by the Canadian Government to keep this road open during the winter. In fact, it was closed November 1, 1953, and not opened again until May of this year.

Two spreads used . . . Two separate main-line spreads plus an extra ditch crew were employed in building the line. One spread started at Fairbanks and worked south while the other started at the Alaska-Yukon border and worked south. In both sections the pipe was laid on top of the ground except for road and stream crossings. However, in the northern section a ditch crew followed the laying gang to ditch, lower in, and backfill the line from Fairbanks to a point about 20 miles north of the Alaskan border. The 40-mile section from Haines to the border of British Columbia was also buried.

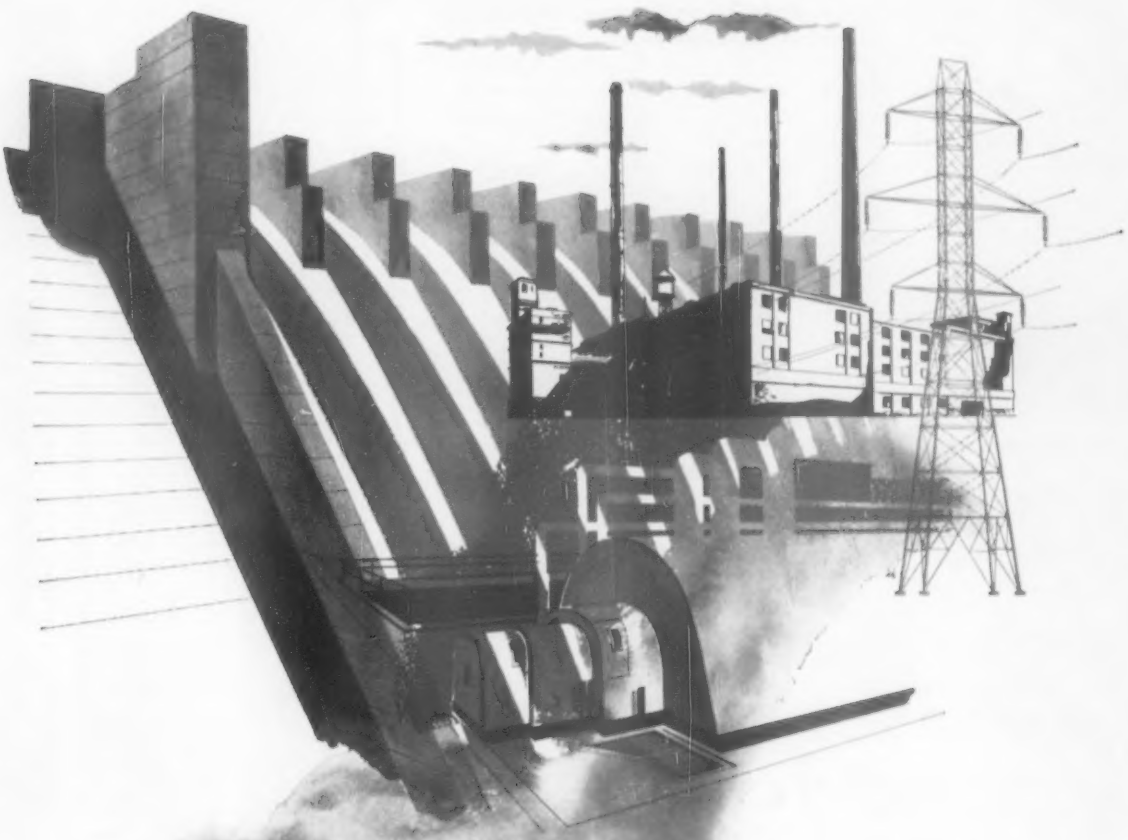
Pipe in the Canadian section was buried only near settlements, at road and trail crossings, at stream crossings, or near station sites. In the entire section, only about 40 miles of ditch was dug. The general practice when laying past a settlement or lodge was to ditch for approximately 1 mile on either side, the primary purpose being to protect the landowner from inconvenience rather than to prevent damage to the line. No provisions were made for tying the line down other than at points which required ditching anyhow.

Equipment used on both spreads was generally comparable to that used on most pipeline projects in this country, with the exception that a few extra tow cats were provided and all welding machines were on self-propelled crawlers. A large portion of the equipment was purchased new for the job. As an exception to this, 300-amp. welding machines were mounted in pairs on stripped-down, modified tractors which had seen considerable prior service but which were still adequate for hauling the welding generators.

The extra tow cats were provided more for getting equipment through mud and muskeg than for work on steep hills, since very few imposing grades were encountered on the line route except for the country just north of Haines.

As for mud, there was plenty of it after the muskeg had been disturbed by clearing and grading operations. From a point about 100 miles north of Haines Junction to the Fairbanks terminal, the terrain through which the line extends is generally muskeg or permafrost. It remains frozen the year 'round because of the excellent insulating properties of the 6-in. to 2-ft. layer of tundra grass which protects it from the summer heat.

During right-of-way work, this tundra was torn up to a considerable extent and, of course, the muskeg had plenty of time to thaw before all construction phases were completed. In some sections, apparently due to heat from underground sources, the muskeg thawed very quickly and was soft to depths of 8 to 10 ft. Consequently, the operation became much like that in any



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THE BAKER JUNK BASKET safely traps, retains and removes from the well cuttings from "drilled-out" cast-iron, aluminum alloys, bronze or other dense, but "drillable" materials. Its design is simple and sturdy, and is readily understood by referring to the sectional illustration (upper right). Between the short Drill Collar (top) and the Drill Collar Sub (bottom) a Cylinder is mounted to provide a basket for trapping a considerable quantity of metal cuttings. When drilling out Baker Cement Retainers, Baker Bridge Plugs, Baker Production Packers, or other devices made of cast iron, aluminum alloys and similar "drillable" materials, a Baker Junk Basket (Product No. 4281) is positioned just above the rock bit, or diamond point bit.

SIMPLE, POSITIVE OPERATION—Cuttings from the drilling bit are carried upward by the high velocity of the circulation fluid through the comparatively small annulus around the Cylinder (see illustration). Now note how the annulus is *abruptly enlarged* due to the smaller diameter of the Drill Collar. When the circulation fluid reaches this enlarged annulus the velocity of the fluid is so greatly reduced that the cuttings are no longer carried upward, but drop into the basket (Cylinder) where they are trapped and recovered when the Junk Basket is removed from the well.

catch those metal cuttings with a---

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Baker Junk Basket
Product No. 4281

AVAILABLE IN POPULAR SIZES—The Baker Junk Basket is furnished to make up in 2⅜" to 4½" A.P.I. drilling strings to run in 4½" to 9⅝" A.P.I. casing. Any Baker representative or office will recommend the proper size for your needs, and see that you are supplied promptly on a low-cost rental basis. Specifications for purchase by overseas operators can be found in the BAKER (or Composite) CATALOG.

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Mobile camp facilities housed sleeping quarters, mess halls, offices, etc. The camps could be dismantled, moved, and set up again in a day.

swamp country and it was necessary to bypass some sections of the line for as long as a month until the right-of-way dried enough for tractors to get through.

Some of these sections were pushed, and in such cases, conventional bolt-on concrete river clamps were used for weighting. Where pipe was laid in soft muskeg, U-shaped concrete weights were placed on the line. These weights were cast by the contractor as they were needed, with the work usually being done at station sites where mixers were available.

Seven major streams were crossed in the entire course of the line and six of these crossings were made on recently constructed steel bridges of the Alcan Highway. The seventh was the crossing of the Duke River in the Yukon. At this point the line route was several miles from the highway and a 3,800-ft. underwater crossing was necessary. Bolt-on concrete river weights were used on this crossing.

No coating . . . The entire line was laid bare but provisions have been made to protect the buried portions against corrosion. A soil survey made by the U. S. Army Corps of Engineers indicated a number of locations where cathodic protection should be applied. As a result, over 1,000 magnesium anodes were installed at designated locations during the construction. The largest installation contains 100 anodes.

Most of the anode groups were placed at "hot spots" where heat from subterranean sources keeps the ground thawed out most of the year. Along the majority of the line, the ground will remain frozen all the year. All cathodically protected sections were isolated by the installation of insulating flanges.

Justification for not coating or painting the aboveground portions of the line stems from observations made on the Canol pipeline system which was laid during World War II. In this system a 3-in. oil line extended from Norman Wells in the Northwest Territories to Whitehorse, Yukon, and a 3-in. products line from Whitehorse to Haines and Fairbanks. The lines were laid bare and on top of the ground for the most part and have suffered no damage from atmospheric corrosion.

Mobile base camps . . . Two construction camps were set up in Alaska and one in Canada. These camps were designed for mobility and could be dismantled, moved, and reassembled in 1 day. Ordinarily the camps were moved in jumps of 50 to 70 miles and remained in each new location until construction crews had worked past them about 25 miles. About 120 men were used in making a move. To assemble this number, as many men as could possibly be spared were borrowed from the construction crews.

Kitchen, mess halls, bunkhouses, offices, showers, etc., were either on trailers or were skid-mounted. A 5,000-gal. tank supplied the camp with water. Fresh water is fairly plentiful along the entire route, either from mountain streams or from wells along the highway, and the haul for water rarely exceeded 10 miles.

Each camp had its own electrical network, power being supplied from diesel-engine-generator units.

The main office of the prime contractor is located near Tok Junction and will remain there for the length of the job. Also at this point are the office and quarters of the resident engineer for the Corps of Engineers under whose supervision the line was laid.

Pump stations . . . The line's three main stations are located at Haines, Haines Junction, and Tok Junction. Each will be equipped with diesel engines and reciprocating pumps. Booster stations at sites 2-A and 2-B will have diesel-centrifugal units.

Stations 1 and 2 are spaced quite closely since the line rises sharply a short distance from Haines. The high point is at an elevation of 3,600 ft. and is located about 15 miles north of station 2. From this point the line drops uniformly to Fairbanks, which has an elevation of about 600 ft.

Each station will be complete with the usual protective devices to shut the station down in case of emergency, but at the present no automatic or remote control operation is anticipated.

Much of the outside work at the stations is now complete and some work will go on at each site through the winter.

Testing . . . The final phase of the system's construction will be in the summer of 1955 when a shakedown testing program will be performed by the prime contractor group. Products will be received at the Haines terminal in the early summer and the line will be ready to go on stream by July 1, 1955. For the next 2 months the line will be operated by the prime contractor and in that time all kinks will be ironed out. On September 1, 1955, the system will be turned over to the Corps of Engineers who will operate it thereafter.

Communications during the test phase and after delivery to the Army will be over wire lines of the Alaskan Communication System. This system is maintained and operated by the U. S. Army Signal Corps. Telephone, telegraph, and teletypewriter circuits have been made available for the operation of the products line.

Simplified tank-battery layout

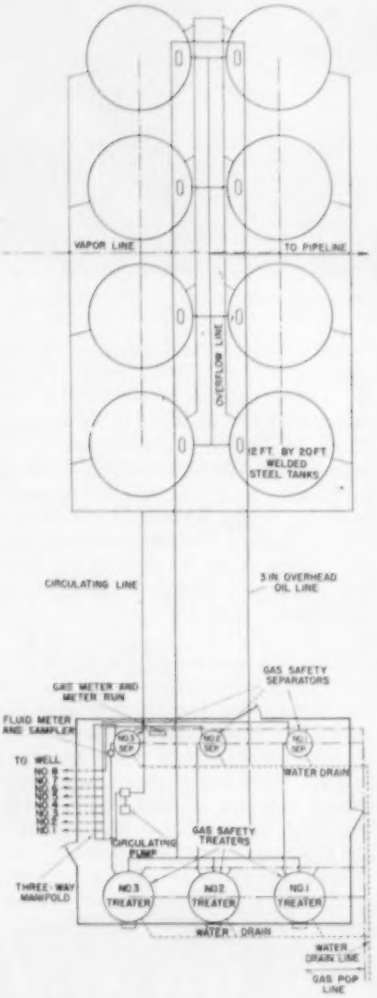
CONTINENTAL OIL CO.'s Duvall tank battery in Colorado's Little Beaver field is laid out for ease of control while saving steps for the pumper. The three heater-treaters, three separators, and a three-way control manifold are all incorporated into one moderate-size building.

Crude from producing wells Nos. 1-8, flowing through their respective flow lines, enters the treater house to the three-way manifold, which routes the crude to the gas separators. After removal of gas, the crude flows to the treater where the b.s. and w. are knocked out. Oil of pipeline quality is then taken off the treater through overhead flow lines to the stock tanks where it is stored until pipeline runs are made.

In this particular battery design, individual well testing is performed through separator No. 3. The designated well to be tested is routed by the manifold to separator No. 3 where the gas is separated from the oil and measured by a gas meter. The liquid leaving the separator (both oil and water) is measured in a liquid meter. A representative liquid sample of the stream through the meter is collected in a sampler from which the percentage of water and oil is determined. These tests result in the measurement of any individual well's oil, water, and gas production.

Special piping arrangements enable the crude to flow directly into stock tanks, treaters, separators, or combinations thereof, depending on the contents of the crude.

The circulating pump is tied into the bottom of the stock tanks and this facilitates the removal of bad tank bottoms. With the circulating pump tied into the three-way manifold, it is possible to pump oil from the stock tanks out through the individual-well flow lines and directly to the well site for storage when performing sandfrac, oil squeeze jobs, etc.



Water drains from the treaters to the sump pit, and this drain line is also tied into the separators. Gas pop or flare lines go to the flare pit, or as in the case of this Duvall battery, will be collected in a gas gathering system to be routed to a gasoline plant. This plant is now under construction.

Faster paraffin-scraping method

IN the Williston basin fields, Amerada Petroleum Corp. crews have their paraffin-scraping equipment so arranged that they can rig up or rig down in a matter of minutes.

First, a gin pole remains fastened to the christmas tree during the flowing life of the well. The gin pole is made from a 30-ft. piece of 2-in. pipe to which are welded stiffening bars that also serve as a ladder. The bottom of the pole is securely fastened to the tree by means of welded bars which encircle the casing head and the tubing head.

The two-man crew drives to the well in a panel truck and lays out the "horses" for the lubricator. The lubricator lays on the horses while the truck is driven to a safe distance on the windward side of the well. While one man is taking the block and tackle to the top of the gin pole, the other hooks the traveling block into an eye on the side of the lubricator. The loose end of the cat line is then wrapped around the wire line so that the paraffin knife will stay up in the lubricator while it is being raised.

By the time these operations have been performed, the "derrick man" is back on the ground taking up slack on the hoisting line. Within a matter of minutes the lubricator is raised and the union on the lubricator matched with the quick-acting union on the top of the tubing head.

Linking engine to draw-works controls

WHERE the power unit on a draw works utilizes a transmission between the engine and the chain drive, a simple ball-and-socket arrangement to attach the gear-shift lever to the

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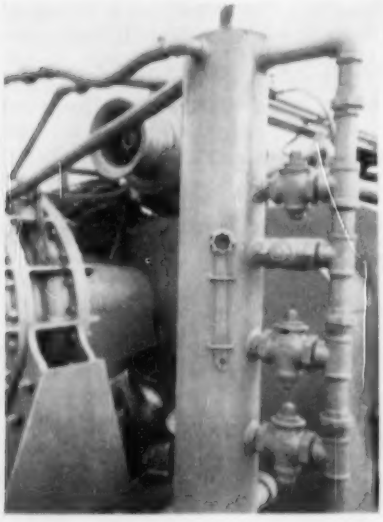
draw works controls can be made. Almost the only material need is the ball-and-socket joint from an automobile or truck. A plate is welded to the gear-shift lever with a hole drilled to fit the bottom of the ball. A piece of ¾-in. pipe is used to make the swing to the driller's platform, and it is welded around the threaded neck that sticks out from the ball.

A nut is made up on the bolt under the ball, and a swing joint is made around the corner of the draw works. The operator will soon learn the feel of the new shifting arrangement. The extra speed adjustment is especially convenient when coming out of the hole because the entire draw works can be shifted into a higher gear with no loss of time when the load becomes lighter.

Header hookup aids hydraulic braking

ON deep wells where the level in the hydraulic braking mechanism must be changed as the load becomes heavier or lighter, a simple header with stop cocks at each of the desired levels is convenient. Penrod Drilling Co. has such a rig-up on its rigs working in the Chenango field of Brazoria County on the Texas Gulf Coast.

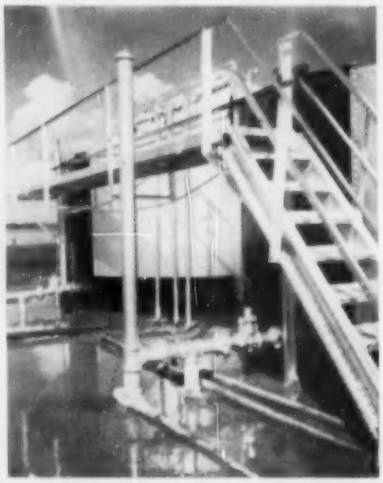
Two lines with flexible hose connections run to the brake chamber and another line is used for a filler line. The filler line is kept running slightly at all times and the valves at the different levels are used to bleed off the water so that the desired level is maintained.



Mobile pipe rack and walkway

WHERE the rigs must be moved frequently for shallow-hole digging, portability of the rig becomes a problem. For that reason Ayers & Burch of Wichita Falls use a walkway mounted on wheels. The walkway is wheeled right up to the rig floor, with the pipe rack loaded on it. As soon as the walkway is spotted, the pipe racks are unloaded and strung out.

The drill pipe is carried on a semi-trailer so that it also can be spotted on the end of the pipe rack and the drill pipe unloaded as needed.



Ball in standpipe shuts off tanks

ON small gathering systems where it is impossible for the gager to make a shutoff as soon as the tanks are empty, air is apt to get into the gathering lines. This air not only causes locks on gravity lines but also increases corrosion rates. One method of preventing this is to place a plastic ball on the oil surface inside the tank. Then when the fluid level reaches the oil outlet, the ball will float into the outlet and seal it off. The big trouble with that arrangement is that oftentimes it is difficult to dislodge the ball from the connection inside the tank.

A relief for this trouble has been found by placing the ball in a plastic standpipe outside the tanks so that the ball rides on the same level as the oil in the tank. Then, when the oil level reaches the shutoff gage, the ball floats down onto a ground joint in the tee outside the shutoff valves. By hooking two tanks together ahead of the standpipe, as shown in the picture, only one of the mechanisms is necessary for a set of tanks.

A small lever is placed inside the standpipe so that the ball can be kicked loose if it becomes stuck. Also, a ¼-in. return line is placed on top to prevent spillage in case the ball rises too rapidly.

Stuffing-box oiler

WHEN a well flows by heads during its initial pumping, it is very often difficult to keep the stuffing box lubricated. There is not enough fluid passing the tee, and the stuffing-box rubbers run dry. The Texas State Drilling Co. in South Liberty field equips its wells with a reservoir made from a pipe protector to hold enough lubricant to last through periods in which no fluid is produced.

The top of the stuffing box is removed and a small plate brazed to it. The pipe protector is set down on the plate, which is then cut to fit the inside of the protector's edge. The assembly is replaced, and approximately 1 qt. of lubricating oil is added.

Series vs. Parallel Arrangement of Centrifugals for Gas Pipeline Stations—1

by Harold Woodhouse

This article begins a new series which will complement the author's previous articles on increasing pipeline capacity with centrifugal compressors. These previous articles appeared in this department as follows: September 6, p. 119; October 4, p. 154; and October 19, p. 129.

BEFORE the advent of the centrifugal compressor into gas-pipeline service, it was standard procedure to arrange reciprocating compressors in parallel in the compressor stations because of their ability to handle a large pressure ratio.

Since there are many in the gas-pipeline business who have never thought of compression except in terms of reciprocating compressors, there is, for the time being, considerable argument and interrogation about using centrifugals in the same manner.

Centrifugals have been used virtually entirely in series on pipelines, except in the few instances where, in dual stations, the stations have been put in parallel, with each station having several centrifugals in series.

This article will describe only very briefly the performance of centrifugals in series since that has been discussed elsewhere—(Increasing Pipeline Capacity with Centrifugal Compressors)—and it will review several of the considerations which have to be taken into account in using centrifugals in parallel on pipelines.

Fig. 1 shows a typical pipeline characteristic with the performance envelopes of one, two, three, and four centrifugals in series superimposed. These envelopes show the total possible variation of compressor suction pressure for a constant station-discharge pressure P_2 with an available compressor-speed variation from 80 to 110 per cent of normal.

While a single compressor could normally operate anywhere within the envelope shown, it must, as a pipeline compressor, operate only along that portion Aaa′ of the pipeline characteristic lying within its envelope. That is, at 80 per cent speed the only point at which it can operate is A, at normal speed at a and at 110 per cent at a′.

With two compressors in series, the possible range of operation is that portion of the pipeline characteristic lying within the envelope for two compressors. It will be noted that, for the same station-discharge pressure, the compressor suction pressure (for the **first** compressor on the inlet side of the station) has dropped from P_{1a} at normal speed to P_{1b} and that the through flow has increased in million standard cubic feet daily from 1_a to 2_b.

Similarly, with three and four compressors in series the station inlet-suction pressure is reduced to P_{1c} and P_{1d} while the flow increases to 3_c and 4_d.

The total possible range of operation with four series-arranged compressors then becomes from A to B on the pipeline characteristic.

Additional compressors can be added to the inlet side of the station without any particular necessity for matching their characteristic curves to those already in the station.

Since each compressor added in this manner would be required to handle a greater volume (because of reduced suction pressure), it should be progressively easier to obtain higher efficiencies with the added compressors.

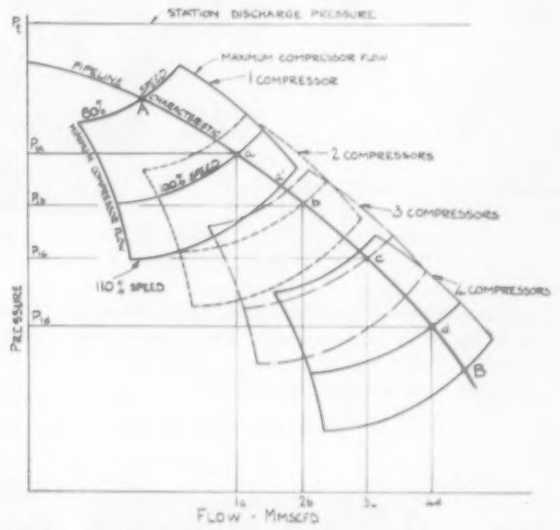
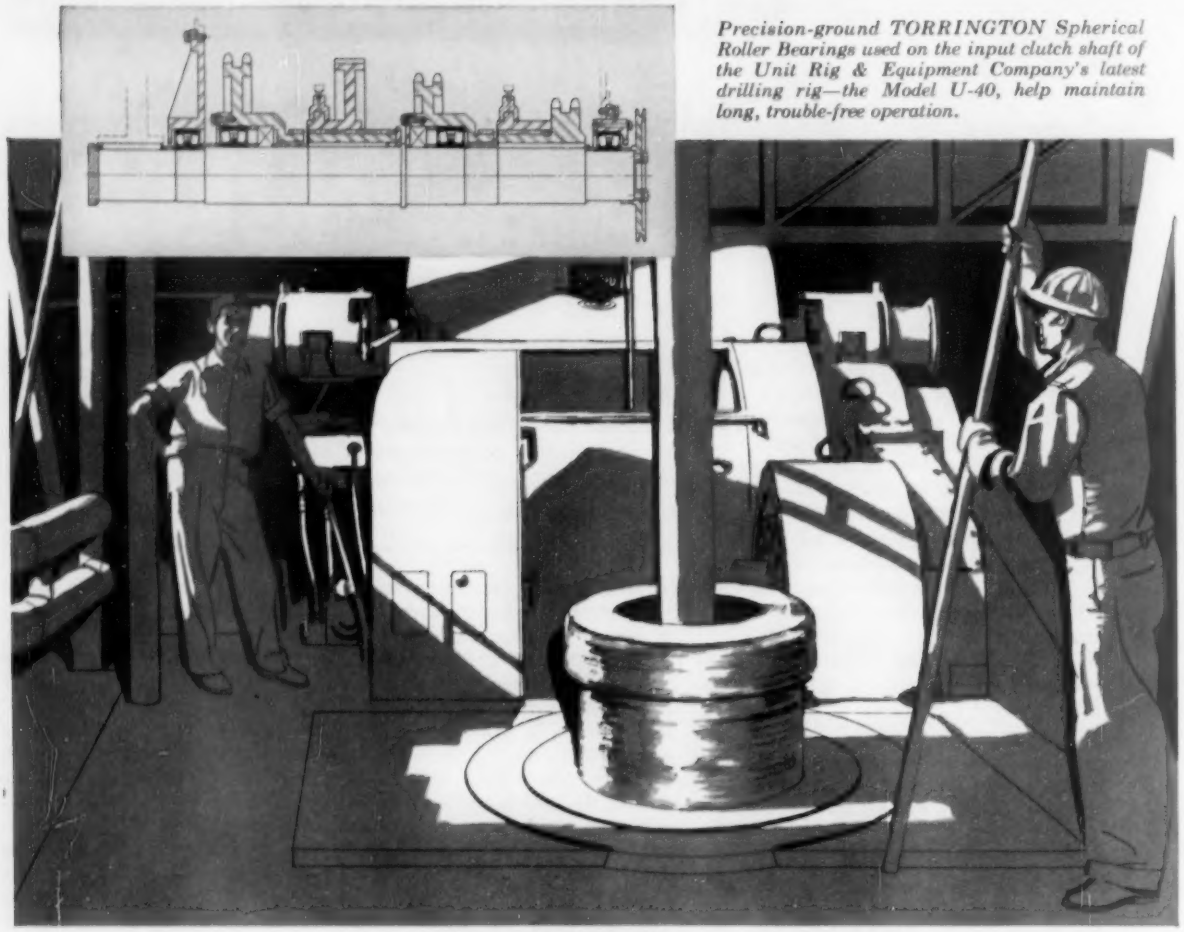


Fig. 1—Typical pipeline characteristic with performance envelopes of four centrifugals in series superimposed.

Author is chief engineer, Dean Hill Pump Co., and consultant on compressor design.

TORRINGTON BEARINGS AT WORK



Precision-ground TORRINGTON Spherical Roller Bearings used on the input clutch shaft of the Unit Rig & Equipment Company's latest drilling rig—the Model U-40, help maintain long, trouble-free operation.

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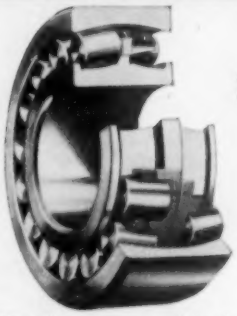

Bearings for the input clutch shaft of the Unit Rig & Equipment's latest 6000′ to 10,000′ drilling rig—the 900 horsepower U-40—must be able to withstand the exacting demands of modern, competitive oil drilling.

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by W. S. Worley

V-Belt Drives for Slush Pumps—2

AN intensive analysis of tests conducted both in the field and laboratory establish the fact that a V-belt fails by fatigue under the repetition of the cyclic stress pattern described in the previous installment. After evaluating many aspects of the stress pattern, it was found possible to derive empirically a relationship between the peak stress in the tensile section of a V-belt and the number of cycles of stress which the belt would endure before failure.

The stress pattern, described in the last installment, was developed for a drive having sheaves of equal diameters. On most drives, the sheaves are not of equal diameter, and it is necessary to take this into consideration in using the fatigue curve to analyze a drive.

Fig. 1 shows the stress pattern for a drive with unequal sheave diameters. As indicated, the peak stress at the small sheave will correspond to a fatigue life of N_1 cycles, while at the large sheave, the lower peak stress will correspond to a higher fatigue life of N_2 cycles. To evaluate the service to be expected under such conditions, we apply the theory of cumulative fatigue, which has been found to be valid for V-belts.

According to this theory, one cycle at a peak stress gives a fatigue life of N_1 cycles and consumes $1/N_1$ of the fatigue life; on cycle at a peak stress giving a fatigue life of N_2 cycles consumes $1/N_2$ of the fatigue life. Therefore, one revolution of a belt shown in Fig. 1 will consume a total fraction of $(1/N_1 + 1/N_2)$ of the fatigue life. If N is the actual fatigue life in cycles, then one revolution consumes the fraction $2/N$ of the total fatigue life:

$$2/N = 1/N_1 + 1/N_2 \quad (1)$$

or

$$N = 2/(1/N_1 + 1/N_2) \quad (2)$$

The average belt life to be expected from the drive is calculated from the relationship:

$$N = \frac{720\ Vhn}{L} \quad (3)$$

where:

n = number of sheaves (in this case, 2)
h = average belt life
V = belt speed, feet per minute
L = belt length, in.

For the application of the stress-fatigue analysis to multiple V-belt drives such as those used for slush-pump service, the problem is to determine, given the diameters, r.p.m.'s, the belt cross-section, and belt length, how much horsepower can be transmitted by a belt for the required average belt life. We will use enough belts on the drive so that the product of the number of belts by the horsepower transmitted per belt will equal the horsepower input to the pump.

If both sheaves were of equal diameter, we could deduct the stress due to bending and that due to centrifugal force, and have left the stress which could be allocated to tight-side tension. From the arc of contact at the small sheave, we could determine a satisfactory tension-ratio T_1/T_2.

After finding T_1 and T_1/T_2, we could calculate T_2, then find $(T_1 - T_2)$, and determine the horsepower rating from the equation:

$$HP = \frac{(T_1 - T_2)\,V}{33{,}000} \quad (4)$$

When the sheaves are not equal in diameter, a slight modification of the above procedure is necessary. Fig. 2 illustrates the idea. Since, $1/N_1 + 1/N_2 = 2/N$, it is possible to substitute for the actual drive with unequal diameters and stresses shown by the solid line, an equivalent drive with equal diameters and stresses shown by the dotted line, which would give the same fatigue life, N. The diameter of the sheaves on the latter drive is called the equivalent diameter.

It has been found possible to express the ratio between the equivalent diameter and the small diameter of the actual drive as a function of only one variable, the speed ratio on the actual drive. While the formula involves an assumption, it is nevertheless accurate to within 95 per cent or more of the true ratio. Using the equivalent diameter, the analysis then follows the pattern set forth above.

Author is with Gates Rubber Co., Denver. From an A.S.M.E. paper presented at petroleum-mechanical conference, Los Angeles, September 29, 1954.

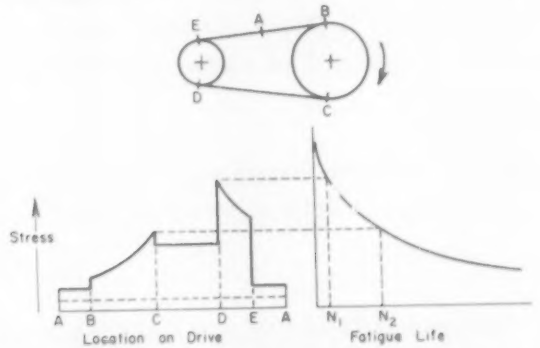

Fig. 1—Stress pattern for a drive with unequal sheave diameters.

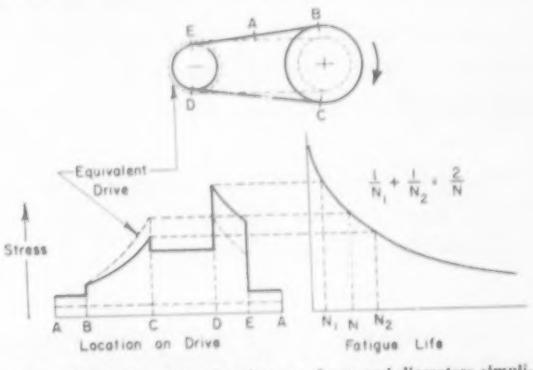

Fig. 2—Equivalent drive for sheaves of unequal diameters simplifies analysis.

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Use of Solutions of the Diffusivity Equation in the Material-Balance Equation

by Dr. R. F. Nielsen

AN over-all material balance may be expressed:

$$nA = N\,(m\,\beta_o\,F + \Delta u) + W - w \qquad (1)$$

where n = stock-tank barrels of produced oil, A corrects this and the produced gas to barrels at present reservoir conditions, N = original oil in place (stock-tank barrels), m = original ratio of gas-cap volume to reservoir-oil volume, β_o = original oil-formation volume factor, F = fractional expansion of the gas cap, Δu = fractional expansion of the oil (with gas liberation), W = barrels of water influx, w = net barrels of produced water (gross minus injected). A, β_o, F, Δu, and w may be evaluated from field and laboratory tests. An approximate value of m may sometimes be available.

Author is associate professor of petroleum and natural-gas engineering, Pennsylvania State University.

The above equation, then, is linear in two or three unknowns. If they were all constants, then, theoretically substitution of proper values at two (or three) stages in the production history should evaluate the unknowns. Water influx W, however, varies continually.

One procedure has therefore been to assume that W is proportional to some function of the pressure and time and determine the nature of the function and the proportionality constant by application of the material balance equation at definite stages. Sometimes W is calculated separately from assumed flow laws and reservoir constants.

Hurst and van Everdingen[1] have prepared tables of solutions of the diffusivity equation for plane radial flow with certain boundary conditions. A discussion[2] of the use of their tables was given previously.

Assume that the water flows radially over an initial inner boundary of an aquifer having a radius r_w. Hurst and van Everdingen give tables for calculating cumulative flow over such a boundary when the pressure history at this boundary, and certain other quantities, are known. To use the tables, the concepts of "reduced time" (t in their tables) and "reduced cumulative flux" must be recalled. The reduced time is:

$$t = \frac{KT}{f\,\mu\,c\,r_w^2} \qquad (2)$$

where the symbols have the usual significance, T being actual time.

The reduced cumulative flux is:

$$Q(t) = \frac{Q}{2\pi\,f\,c\,r_w^2\,h\,\Delta p} \qquad (3)$$

where Δp is the pressure decline at the inner boundary. Table 1 of Hurst and van Everdingen gives values of Q(t) as a function of reduced time t for an aquifer large enough to be

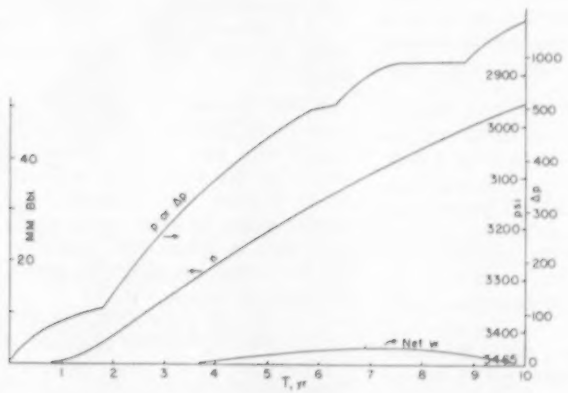

Fig. 1—The quantity A of the material balance equations as a function of pressure for the Magnolia field.

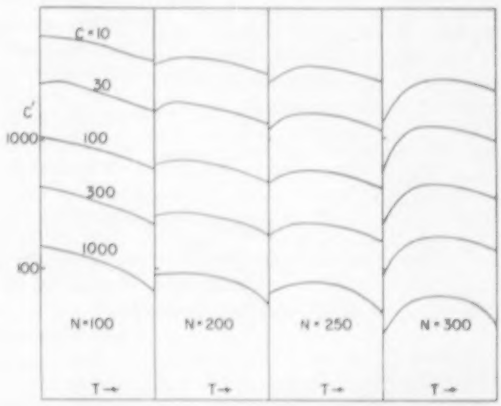

Fig. 2—Pressure drop as a function of time and years, together with pressure, oil, and water production.

considered infinite over the time range covered by the table. Table 3 gives similar values for a closed reservoir with various values of the ratio (denoted by R) of the radius of the external boundary to that of the internal boundary.

Since values of the various constants in the equations are not always known, it seems logical to lump them into composite constants, and to determine values by setting up trial material balances at various stages in field history. Equations 2 and 3 may be written:

$$t = CT \tag{4}$$

$$Q(t) = C'/\Delta p \tag{5}$$

To illustrate the trial method of finding C and C′, the information on the Magnolia field given by Pirson[3] will be used. Values of the quantities in Equation 1 must be determined at a series of pressures from field and laboratory data, N and W being unknown. A is given by $\beta + \alpha (r_a - S)$, where β is oil-formation volume factor, α converts standard cubic feet of gas to barrels at reservoir conditions, r_a is average field gas-oil ratio, standard cubic feet divided by stock-tank barrels, S is gas solubility, standard cubic feet divided by stock-tank barrels. Fig. 1 gives A as a function of pressure for this field.

For simplicity, m is assumed known in advance as 0.214, $\beta_o = 1.476$, $F = [(p_o Z/pZ_o) - 1]$, and $\Delta u = \alpha (S_o - S) - (\beta_o - \beta)$. Fig. 1 gives $m\beta_o F - \Delta u$.

The pressure drop Δp of Equations 2 and 4 is assumed equal to the average field pressure decline. A method of continuous superposition will be used to find the total flux from $T = 0$ up to discrete times T_1, T_2, etc., at which the pressure drop is Δp_1, Δp_2, etc. That is, for any increment in Δp, $d(\Delta p)$, at time T, a value of dQ is superposed for time $T_1 - T$, for instance, when total flux W_1 up to T_1 is being calculated. Thus:

$$\int dQ = W_1 = C' \int_0^{\Delta p_1} Q(t) \times d(\Delta p), \text{ etc.} \tag{6}$$

Values of Q(t) are taken from the Hurst and van Everdingen Table 1, taking the reduced time t as $t = C(T_1 - T)$, etc. A series of values of C are assumed, and six different stages in the production history will be taken, so that for each value of C assumed there will be six integrals like Equation 6, giving the total flux up to T_1, T_2, etc. To get an idea of the order of magnitude of C, we may take K = 1,500 md. = 9.5 "perms," f = 0.17, $\mu = 0.3$ cp., $c = 3 \times 10^{-6}$, $r_w = 8{,}000$ ft. This makes C the order of unity when T is in days or 300 if T is in years. The values selected are 10; 30; 100; 300; and 1,000; with T in years. The calculations are presented in the next number of this series.

TABLE 1—INTEGRALS × 10^{-6}

C	1	2	3	4	5	6
10	0.00132	0.00364	0.0069	0.010	0.0143	0.0178
30	0.00304	0.0080	0.01575	0.024	0.0334	0.0433
100	0.00785	0.0222	0.0428	0.0653	0.092	0.120
300	0.0195	0.056	0.108	0.164	0.224	0.310
1,000	0.054	0.160	0.303	0.460	0.677	1.080

The pressure drop Δp as a function of time in years is shown in Fig. 2, together with pressure, oil, and water production, (minus water injection). The material balance equation will be set up for times 2.3, 3.8, 5.3, 6.8, 8.3, and 9.8, which will be referred to by subscripts 1-6. Taking values from Figs. 1 and 2 and substituting them in Equation 1, the following six equations are obtained for the six times, N and W being in millions of barrels:

$$\begin{aligned} 11.33 &= 0.032\,N + W_1 \\ 28.65 &= 0.066\,N + W_2 \\ 46.53 &= 0.091\,N + W_3 \\ 62.66 &= 0.115\,N + W_4 \\ 75.00 &= 0.125\,N + W_5 \\ 85.55 &= 0.145\,N + W_6 \end{aligned} \tag{7}$$

For each of the five assumed values of C, there will be a set of six equations. Denoting the integral of Equation 6 by I, a set of six equations is obtained in which $W_1 = C'(10) \times I_1(10)$, $W_2 = C'(10) \times I_2(10)$, etc. Another set is obtained in which $W_1 = C'(30) \times I_1(30)$, and so on. The parentheses mean that the value of C′ and I correspond to C = 10, 30, etc. The set of equations which gives the most consistent values of N and C′ should be the one for which the best value of C was chosen.

The integrals were evaluated graphically by plotting Q(t) against Δp. For instance, to evaluate $I_1(10)$, $t = 10(2.3 - T)$, and values of T = 0, 0.8, 1.3, 1.8, and 2.3 were chosen, giving t = 23, 15, 10, 5, and 0. Corresponding values of Q(t) from the tables are 13.8, 10, 7.4, 4.5, and 0. Plotting Q(t) against Δp, which is 0, 75, 95, 110, and 177, the integral is found to be 1,320. The process is repeated for the next stage where $t = 10(3.8 - T)$, plotting Q(t) against Δp from $\Delta p = 0$ to 341. After the six integrals are evaluated, the entire procedure is repeated using 30, 100, etc., instead of 10. The intergrals (times 10^{-6} since W is in millions of barrels) are given in Table 1.

In trying to solve various combinations in each set of equations for N and C′ the usual difficulty was encountered, namely, that small discrepancies in the material balance, using the data, are reflected enormously in the values of C′. The following procedure was therefore used instead. Values of N, of reasonable magnitudes considering the total production, were substituted, and the equations solved for C′. Values of C′ obtained for N = 100, 200, 250, and 300 (Pirson gives N = 244) are shown in Fig. 3 for the five values of C.

Apparently consistent values cannot be obtained over the entire production history. The injection of quantities of water in the last stages far above that produced may account partly for the drop in calculated values of C′. Failure to fall in line with the theory of plane radial expansion of a large aquifer may of course be due to many things. Fig. 3 indicates that N is in the range 200-250, and C in the range 10-100.

It will be observed from Table 1, incidentally, that the trend in the integrals with time is not greatly affected by the value of C selected. Hence it seems that the method described would be most applicable to reservoirs in which the water invasion corresponds rather closely to the assumed theory.

References

1. Hurst and van Everdingen, Petroleum Trans., A.I.M.E., 1949, p. 299.
2. Nielsen, The Oil and Gas Journal, July 27, 1954.
3. Pirson, Elements of Oil Reservoir Engineering.

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Applying Spectroscopy in Petroleum Analysis—3

by R. C. Pomatti, R. F. Meeker, and Harry Levin

QUANTITATIVE analysis is based on the fact that a compound absorbs radiation in proportion to its concentration. By comparing the absorption of a sample with known standards, we determine the concentration of the unknown either by calculation or by referring to an analytical curve drawn from the standards. (Fig. 6 shows the increasing absorption of a sample in the 11-μ region as the percentage of a phenolic compound in the sample increases.)

Fig. 7 illustrates a problem solved very effectively with infrared absorption. We were asked to analyze, qualitatively and quantitatively, an unknown liquid in connection with an antifreeze problem. With this information, and the fact that there was a big band of 3 μ, we referred to the alcohols and glycols in our reference library of spectrograms and identified the unknown as a 50-50 mixture of ethylene and propylene glycols.

Authors are with The Texas Co., Beacon Laboratories, Beacon, N. Y.

Fig. 8 illustrates the correlation of infrared absorption with hours of use of an industrial oil in a laboratory test engine. Absorption was measured in the 5.6 to 6 μ region which is indicative of the carbonyl group, a product of oxidation. The oil had undergone so little change that the neutralization number at 700 hours was still less than 0.1.

One advantage of absorption analysis is its rapidity. Spectra of samples in qualitative work may be obtained in a few minutes and interpretations usually do not take much longer. Other advantages are the small sample size needed for an analysis—at times only a few drops or a few milligrams. Samples are usually recoverable in unchanged condition after an analysis and there is a permanent record of each analysis that can be used for future reference and comparison.

We can analyze qualitatively and quantitatively for about 70 elements, mainly metallic ones, in any type of sample by emission spectroscopy. Elements are detected as atoms, not as their chemical combinations. Samples most frequently encountered in a petroleum spectroscopic laboratory include used and unused oils and greases, crude oils, additive concentrates, engine deposits, crankcase sludges, bearing alloys and other metals, fuels, catalysts, various chemicals, and precipitates obtained in chemical analysis.

Outstanding among the advantages of this type of analysis are speed and sensitivity. If necessary, a complete qualitative analysis can be made on most samples in about 20 minutes. No other method can approach this. Once the method has been developed, a quantitative determination usually can be completed in a fraction of the time necessary by chemical means. In repetitive work, an enormous saving of time is achieved. There are direct-reading instruments, using photomultiplier tubes, with which a metal or alloy is analyzed in minutes. Work is being done to adapt these instruments to the analysis of lubricating oils.

As in absorption spectroscopy, here, too, a few milligrams or a few drops of oil are sufficient for analysis. Several elements can be determined simultaneously through only a few parts per million be present.

Besides its value in giving a complete analysis by itself for many types of samples, spectroscopic means are also valuable as a guide and aid in chemical analyses where it may reduce the number of steps in quantitative work, to check the purity of a precipitate and to determine the completeness of a chemical separation.

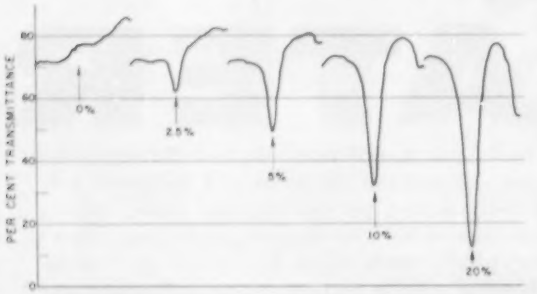

Fig. 6—Infrared absorption of a phenol in the micron region.

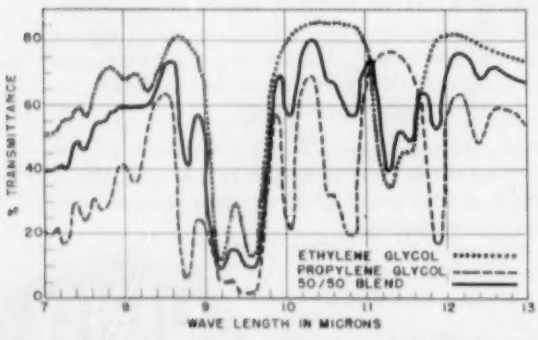

Fig. 7—Unknown liquid was analyzed as 50-50 mixture of ethylene and propylene glycols.

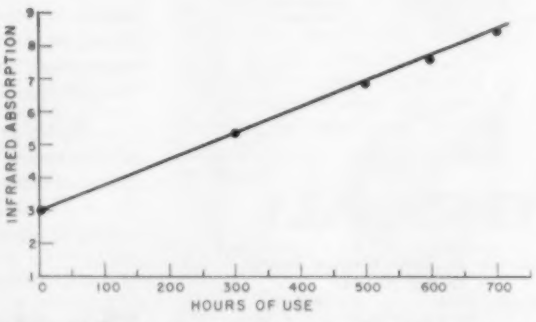

Fig. 8—Hours of use of an oil in a test machine vs. infrared absorption at 5.9μ.

Pipeline Patrol

. . . Report on Construction

Hard Digging on Gas Line Spread

A BATTERY of gang drills chews away at rock on right-of-way of the Gulf Interstate Gas Co. line on its route through Tennessee. Even in rocky country like this, the construction progressed at an over-all rate of 4,000 ft. per day, and all pipelaying work averaged about 6,000 ft. per day.

The 845-mile 30-in. main line extends from Rayne, La. to Catlettsburg, Ky., and is scheduled to begin delivery today into lines of the Columbia Gas System, Inc. at a rate of 375 M.c.f. per day.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Arapahoe Pipe Line Co.—This company owned jointly by Sinclair and Pure has let contracts on a 494-mile crude line from Merino, Colo., to Humboldt, Kans. The contracts were let in the following sections:

Section 2.—162 miles of 18-in. from Colby to Schurr Station, Kans., R. H. Fulton.

Section 3.—84 miles of 20-in. from Schurr Station to Burns, Kans., R. H. Fulton.

Section 4.—86 miles of 20-in. from Burns to Humboldt, Panama Williams Co.

Ar-Mex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude-oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude-oil line from Guernsey, Wyo., to Albuquerque.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Cheyenne Valley Pipe Line Co.—Company planning a 96-mile, 10-in. crude line from Lance Creek to Fort Laramie, Wyo. Line will cost $1,838,241 and will connect with the Platte Pipe Line system at Fort Laramie.

Continental Pipe Line Co.—Has awarded contract to G. G. Griffis Construction Co. to build 64-mile, 12-in. crude line from Oklahoma City to Ogg Station near Tonkawa, Okla. The line will give Conoco a complete 12-in. system between Wichita Falls, Tex., and the company's Ponca City, Okla., refinery.

Interstate Oil Pipe Line Co.—Company will build 32 miles of 8-in. crude line from Gwinville field of Jefferson Davis County, Mississippi, to the Soso field in the tri-county area of Jones, Jasper, and Smith counties, Mississippi. Completion set for December 1.

Magnolia Petroleum Co.—This company

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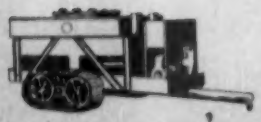
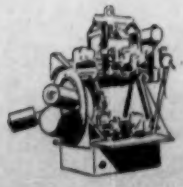
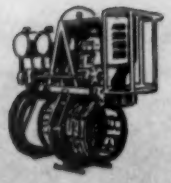


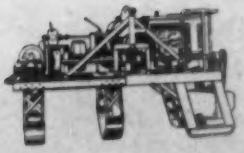
PIPELINE KETTLES



COATING & WRAPPING MACHINES



CLEANING & PRIMING MACHINES



ROAD BORING MACHINES

Manufacturing Company, Inc.

Pipeline Patrol

will operate a 48-mile, 12-in. submarine pipeline for itself and Continental Oil Co., and Newmont Oil Co. The line will run to blocks off the coast of St. Mary's Parish, Louisiana, and will have a capacity of 50,000 bbl. per day. Brown & Root, Houston, has the contract and expects to be finished by the middle of 1955.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000, is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming, to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

Shell Pipe Line Corp.—Company has awarded Anderson Bros. Corp. a contract to lay 35 miles of 12-in. crude line from Cabin Creek field in Montana to a tank-car loading rack on the Northern Pacific Railroad near Glendive, Mont.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. 12-in. line. Bids being asked.

Western Pipe Line Co.—This subsidiary of Service Pipe Line Co. has let contracts for 630 miles of 20, 22, and 24-in. crude line from Fort Laramie, Wyo., to Freeman, Mo. The western section of the line will be laid by H. B. Zachry Co. and the eastern section will be constructed by O. R. Burden Construction Corp. Completion set for December 1.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. 2d section of 32 miles from Lockport to Des Plaines, Ill., let to Contract and Material Co. of Evanston, Ill.

65 miles of 12-in. from Des Plaines to Rockford let to Contracting & Material Co. Evanston, Ill.

56 miles of 12-in. from Rockford to Madison let to Mid States Construction Co. of Mount Vernon, Ill.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—This company has awarded 80 miles of 8-in. products line between Lima and Columbus, Ohio, to Sheehan Pipe Line Construction Co. of Tulsa. The line is expected to be in operation by the end of the year.

Cherokee Pipe Line Co.—Company will convert a recently purchased crude line into an aviation and jet fuel carrier from Ponca City, Okla., to Wichita. The company also plans to lay about 8 miles of line to complete the present system into Wichita. Line will serve refineries of Continental Oil Co., and Cities Service Oil Co., joint owners of Cherokee.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Maico Pipeline, Inc.—Company planning to build a 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

Oil Basin Pipe Line Co.—Midwestern Constructors, Inc., doing the work on this 230 miles of 8-in. products line from Laurel to Glendive, Mont. Cost: $5,350,000.

Phillips Petroleum Co.—Company has let 72 miles of 8-in. line to Somerville Construction Co. of Ada, Mich. Work being done between East St. Louis and Kankakee, Ill.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

Standard Oil Co. of Texas.—Company taking bids for the laying of a 248-mile, 6-in. products line from El Paso to Albuquerque. The line will move 5,000-bbl. daily when finished and will cost $4,000,000.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has asked FPC permisison to abandon "Little Inch" gas line. If permission is granted, company will spend $71,000,000 converting the line to a products line with a capacity of 235,000-bbl. per day.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles of 8-in. under way from Haines northward through Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Construction Co. are doing the work. Pipe laying will be through by November of 1954; however, entire job not expected to be completed until September of 1955.

Wyoming-Nebraska Pipeline Co.—Houston Contracting Co. has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebr. Work expected to be completed by November 1954.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Loupisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich Estimated cost: $130,000,000. FPC approved.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles. 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in., planned, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas. F.P.C. approved.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri. F.P.C. approved.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., F.P.C. approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Home Gas Co.**—Work under way on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Work under way on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., Doddridge, Wetzel and Marshall counties, West Virginia. Fulghum Contracting Co. doing work.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles,

Pipeline Patrol

8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

Natural Gas Pipe Line Co. of America.—Company has proposed a 280-mile line from Wise County, Texas to Panhandle field in Texas where it would connect with the Peoples Gas & Light Co. line to Chicago.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co., and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Company has just recently finished a large summer expansion. Still planned are:

170 miles of 20-24-in. line in Minnesota and Wisconsin running from Duluth to Superior.

400 miles of 24-in. line from the Canadian border to tie in with its system at St. Paul-Minneapolis.

500 miles of 24 or 30-in. planned across North Dakota from Tioga past Minot to Fargo and from there eastward to the Twin Cities.

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox., and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking, and Fairfield counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in,. planned, paralleling Topock-Milpitas lines. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Panhandle Eastern Pipe Line Co.—FPC has given this company a temporary certificate to construct 295 miles of 30-in. looping to get additional gas to companies in Illinois, Indiana, Michigan, Ohio, and Missouri before cold weather. The job is costing $22,885,000 and is part of a $66,750,000 expansion program. The remainder of the program calls for $23,580,000 for new compressors and the leaching out of an underground storage cavity near Waverly, Ill., and $11,427,500 for production and gathering facilities improvements in the field.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 382-mile, 24-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Cost: $3,269,000. FPC approved.

Texas Eastern Penn-Jersey Transmission Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000. Line to be completed November 16.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson-Davis Parish, Louisiana. Work to be done in September and October by Houston Contracting.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trunkline Gas Co.**—Proposes to cross

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Pipeline Patrol

the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season during summer. Work resumed September 15.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

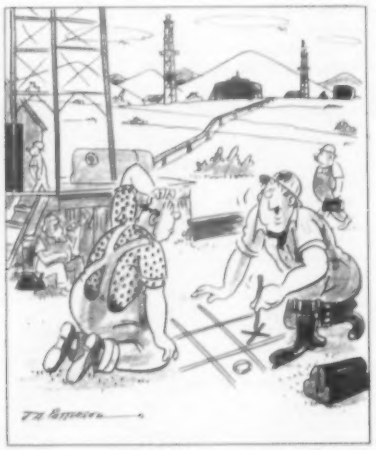
Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

• **Pembina Pipe Line Co., Ltd.**—Company building 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co., and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.



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72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

• **Petroleos Mexicanos.**—145 miles, 12-in., under way, Jose Colomo to El Plan, Mexico.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 150 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished by November.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Yacimientos Petroliferos Fiscales Bolivianos.—Bolivian Government oil organization has awarded contract to Williams Brothers, Sudamericana, Ltd., to construct a 6-in. crude line from Camiri field to Yacuiba on the Argentine border. The project will cost approximately $2,500,000.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden,. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

Australasian Petroleum Refinery, Ltd.—Company plans two lines from the new Kwinana refinery in western Australia to the port of Fremantle to be completed early in 1955. One line will be 15 miles of 12-in. The other line will be a 17-mile, 6-in. line.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co., Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Union Gas Co. of Canada, Ltd.**—Proposed line from Lambton County gas-storage fields to Oakville. Line is being proposed now and will eventually join with proposed line from Alberta to Toronto and Montreal.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

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REFINING

Petrochem Novice

Solvay enters field with chlorinated methane plant

MOUNDSVILLE, W. Va. — Solvay Process Division of Allied Chemical & Dye Corp. has commenced operation of its plant for chlorinated methane products here. The Big Inch pipeline runs through Solvay's plant site, and supplies the plant with feed stock through Hope Natural Gas Co. Hope strips out ethane and heavier hydrocarbons, and delivers a pure methane product to Solvay.

The methane is chlorinated by replacement of 1, 2, 3, and 4 of the hydrogen atoms by chlorine to produce respectively: methyl chloride, methylene chloride, chloroform and carbon tetrachloride. Reactions take place at high temperature using a ratio of five volumes of methane or recycled gas to one volume of chlorine. If desired, methyl chloride can be recycled up to a maximum content of 20 per cent of total hydrocarbon gas feed for complete conversion to higher chlorinated methanes.

Reactor effluent consists of a mixture of the four products, plus impurities and hydrogen chloride. The HCl is scrubbed out and the remaining stream neutralized, refrigerated, and then separated into the four products. Plant design provides for considerable flexibility and for future expansion.

The plant will supply a growing market for chloromethanes used in rubber, plastics, paints, aircraft construction, aerosols, photographic film, drugs, and organic chemical production. Moundsville represents Solvay's first entry into the chlorinated methane field, and into petrochemicals.

Fluor Awarded Sovaformer

NEW YORK CITY.—Socony-Vacuum Oil Co. has contracted with Fluor Corp., Ltd., of Los Angeles for construction of a 20,000-bbl. per day Sovaforming unit and prefractionation facilities at the company's 105,000-bbl. per day refinery at Paulsboro, N. J.

This is one of 11 Sovaforming units which will be built in Socony and affiliated refineries in this country. Total capacity of the 11 units, which employ a platinum catalyst, will be 94,000 bbl. per day.

Two 19,000-bbl. per day Thermofor catalytic reforming units are also nearing completion at Torrance, Calif., and Beaumont, Tex.

Old Lube Plant To Close

NEW YORK.—One of the nation's oldest refining sites will be closed soon when Esso Standard Oil Co. transfers all operations of the Eagle Works in Jersey City to the nearby Bayonne, N. J., refinery.

At one time Eagle Works was one of the largest lubricating oil plants in the world. Operations date back to 1878 when the old Eagle Oil Co. moved there from Carbondale, Pa.

Since 1929, operations of the plant

NELSON REFINERY CONSTRUCTION INDEX

Appears on the Refining page in the first issue each month.
Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.
The Index was explained July 7, 1952 (page 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

Index (1946 = 100)

	1948	1950	1951	1952	1953	July 1954
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.6
Electrical machinery	127.6	134.9	154.3	154.2	156.4	159.4
Internal-combustion engines	116.9	126.0	146.1	146.5	148.1	150.6
Instruments	120.0	127.8	142.3	146.2	151.8	153.9
Heat exchangers	130.0	140.0	152.0	165.8	174.9	166.4
Miscellaneous equipment average	122.1*	126.2*	145.1*	153.3	158.8	159.4
Materials component	139.3	149.5	164.0	164.3	172.4	175.0
Labor component	128.0	144.0	152.5	163.1	174.2	184.0
Nelson construction index	132.5	146.2	157.2	163.6	173.5	180.4

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous quipment Items shown above.
than the average of the Miscellaneous Equipment Items shown above.

See Composite and Refinery Catalogs, or Write for Folder On

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have gradually been cut back and only lube, blending, and shipping operations are now carried out. The 100 employes will be transferred to Bayonne as the operations are absorbed there.

Gulf Nears On Stream Date With Platformer

PHILADELPHIA.—Gulf Oil Corp.'s new 16,000-bbl. per day Platforming unit, now nearing completion at its refinery here is expected to go on stream this month.

It will be the first of four such units now building at Gulf refineries including a 29,000-bbl. plant at Port Arthur, Tex., and two 10,000-bbl. per day units at the Toledo and Cincinnati refineries, all scheduled for completion next spring.

The Port Arthur facilities will make blending stocks for aviation gasoline as well as motor fuel, and the other three will contribute specifically to motor fuel octanes. They will largely replace the company's existing thermal reforming capacity at the four refineries.

All were designed by Universal Oil Products Co. of Des Plaines, Ill. The Port Arthur installation is being built by Fluor Corp., Ltd., and Procon Corp. is the contractor for the remaining units.

Catformer Work Completed

GLADEWATER, Tex.—Gladewater Refining Co. has gone on stream with a 700-bbl. Catformer at its refinery here.

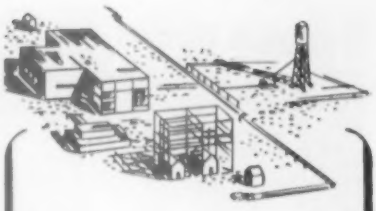
The unit, licensed and designed by Atlantic Refining Co., is the first built that will use the same stock as was used in obtaining original design data for these units.

The construction was done by personnel of the refinery, and design and supervision was directed by Pona Engineers, Inc., Houston.

A.S.T.M. Manual Ready

PHILADELPHIA.—A collection of 11 papers on temperature stability of electrical insulating materials has been published by the American Society for Testing Materials. The symposium is concerned mainly with test methods and standards for determining the thermal stability of insulating materials.

These new guides have become necessary, according to A.S.T.M., in view of the rapid development of new insulating materials. Copies of the special technical publication (STP No. 161) are available from A.S.T.M., 1916 Race St., Philadelphia 3, Pa., at $2.75 each.



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Among the Drilling Contractors

Dallas Oil Firm Forms New Drilling Affiliate

Ray Smith Drilling Co. is a newly formed drilling company operating in North and West Central Texas. It is affiliated with Harry Todd Oil Co., of Dallas, and operations will be directed by E. A. Carter, vice president and general manager of that company.

The company is starting with a new rig, including a Brewster N-45 draw works, powered through torque converters by two WAKU Waukesha engines; an Emsco D-300 pump with a LROU Waukesha engine; and a 96-ft. Lee C. Moore jack-knife derrick on 7-ft. substructure.

G. B. Burris, of Abilene, Tex., is tool pusher. Drillers are Ray England, Jack Davee, and T. O. Meadors.

Delta Gulf Add Pushers

Delta Gulf Drilling Co., Dallas, reports that because of its increased operations, it added five tool pushers, promoting that number of its drillers. New pushers are A. L. Martin, Jr., West Texas division, Odessa; and W. L. Green, E. H. Horton, I. J. Flowers, and H. M. Bagley, Gulf Coast Division, Houston.

Rock Hill Drilling Co., San Antonio, is drilling on a 9,000-ft. wildcat test 5 miles northwest of Edinburg, in Hidalgo County, in Texas' Rio Grande Valley. Contract is for Carrl Oil Co. at 1 Johnson, in the San Salvador del Tule Grant.

Glasscock-Wilson Drilling Co. is scheduled for an 8,500-ft. test to be drilled for Sun Oil Co. at a wildcat location 3 miles northeast of the operator's new Kinder field, in Allen Parish, Louisiana Gulf Coast. Location is for 1 Bel et al., in 22-6s-4w.

C. J. Foster Drilling Co., Richmond, Tex., has a new deep contract job under way for Ada Oil Co. in Matagorda County, Texas Gulf Coast. It is at 1 Lewis & McDonald, in the C. G. Cox Survey, about 1½ miles southwest of Wilson Creek field. Hole is projected to 11,500 ft.

Clinch Drilling Co., Jackson, Miss., is a joint operator with E. C. Wentworth, of Natchez, Miss., on a 5,500-ft. Wilcox test it is scheduled to drill west of production in Wildsville field, Concordia Parish, eastern Louisiana. The test is listed as 1 Wilkerson, with location in 13-7n-6e.

New California Company To Contract in Trinidad

International Brown Drilling Co., recently organized affiliate of Brown Drilling Co., Long Beach, Calif., has moved a new heavy-duty rotary rig to Trinidad, British West Indies, where it is under contract to drill for Dominion Oil, Ltd.

This is reported to be the first contracted drilling on Trinidad. The equipment, newly assembled and unitized in California prior to shipment, is designed for drilling to 10,000-ft. depths.

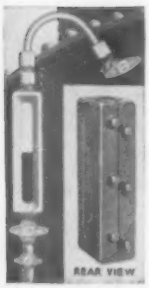
The new company was formed to handle Brown Drilling Co.'s foreign contract obligations.

W. C. Fatjo Drilling Co., Lafayette, La., has a new operation scheduled for drilling in the North Elton area, in Allen Parish, South Louisiana. It will be an 8,650-ft. Nodosaria test for Bel Oil Corp. Location is for 1 Reed et al, in 24-6s-3w.

Zack Brooks Drilling Co., El Dorado, Ark., is drilling on a new contract operation in the Bolton area, Hinds County, Mississippi. The test, for Dick D. Quin, of Jackson, Miss., is projected to the Paluxy horizon, productive in the new Bolton field. Contract depth is 10,200 ft. Location is about 2 miles north of development in the field. Designation of the test is 1 Mashburn, in 7-6n-2w.

H. L. Rowley, Inc., Shreveport, is under contract to Sinclair Oil & Gas Co. for another well in the new Sweetwater field, southern Lincoln County, Mississippi. The well, 1 Moak, will be a northwest offset to A. O. Phillips' discovery well, completed last February with oil production from lower Tuscaloosa sand around 10,790 ft. This is Sinclair's second well in the field. The first, north offset to the discovery well, was completed last July.

Falcon Seaboard Drilling Co., Tulsa, has a new operation under way for Cities Service Oil Co. in the Fausse



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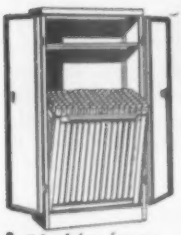

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PATENT NO. 1610368 Other Patents Pending

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Pointe area of Iberia Parish, southern Louisiana. Location, at 1 Granger, in 33-11s-8e, is a mile from production. Contract is for 10,800 ft.

F. E. Gober Drilling Co., Long Beach, Calif., is contractor on a new Nevada wildcat Bandini Petroleum Corp., of Los Angeles, has under way. The test, 1 Government-Harris, in 25-10n-57e, is 7 miles north of Shell Oil Co.'s discovery well on Eagle Springs unit, near Elko.

Dixie Drilling Co., Dallas, is drilling on Pure Oil Co.'s second well for the recently opened South Gueydan gas-condensate field, in Vermilion Parish, Louisiana Gulf Coast. The new operation, 3 Vermilion Parish School Board, is ½ mile north of the discovery well, completed in sand at 10,498-516 ft.

Montgomery Drilling Co., El Dorado, Ark., is drilling a 7,300-ft. Smackover exploratory test on the northeast flank of Hibank field, Union County, Arkansas. E. G. Bradham, also of El Dorado, is operator. The test is 1 Patterson Unit, located in 19-18s-14w.

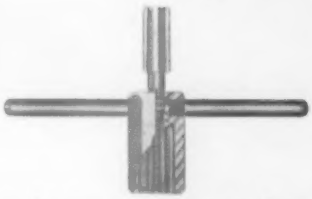
Vasser Drilling Co., Natchez, Miss., has contracted for a 5,000-ft. test to be drilled for Delta-Caribbean Oil Corp. at a wildcat location at Mills Bayou, 3¼ miles east of Kelso, in Desha County, southeastern Arkansas. The test is carried as 1 Grief Brothers. Location is in 32-10s-1w.

Rebstock & Reeves Drilling Co., New Orleans, is scheduled to drill a deep wildcat test for Union Oil Co. of California in Iberia Parish, Coastal Louisiana. It will be carried as 1 Peterman. Location, in 31-12s-11e, is about 2 miles south of Bayou Pigeon field.

Sunnyland Contracting Co., Rayne, La., has contracted with Serio-Punches Oil Co. and Billups Brothers, of Natchez, Miss., for a 6,800-ft. Wilcox test to be drilled about a mile southwest of production in Pellucid Bayou field, southeastern Adams County, western Mississippi. Location is for 1 Board of Supervisors, in 16-5n-1w.

Petersen Drilling Co., Shreveport, has a new 7,000-ft. wildcat test under contract. It will be drilled for Clay Oil & Gas Co., of Monroe, La., in northwestern Amite County, southwestern Mississippi. Location is for 1 Sherman Huff heirs, in 18-4n-1e. It is about 2 miles east of Rosetta, and about the same distance southeast of Freewoods field, in southwestern Franklin County.

SLUSH PUMPS
Cleanout
TAP *and* DIES
by Baird



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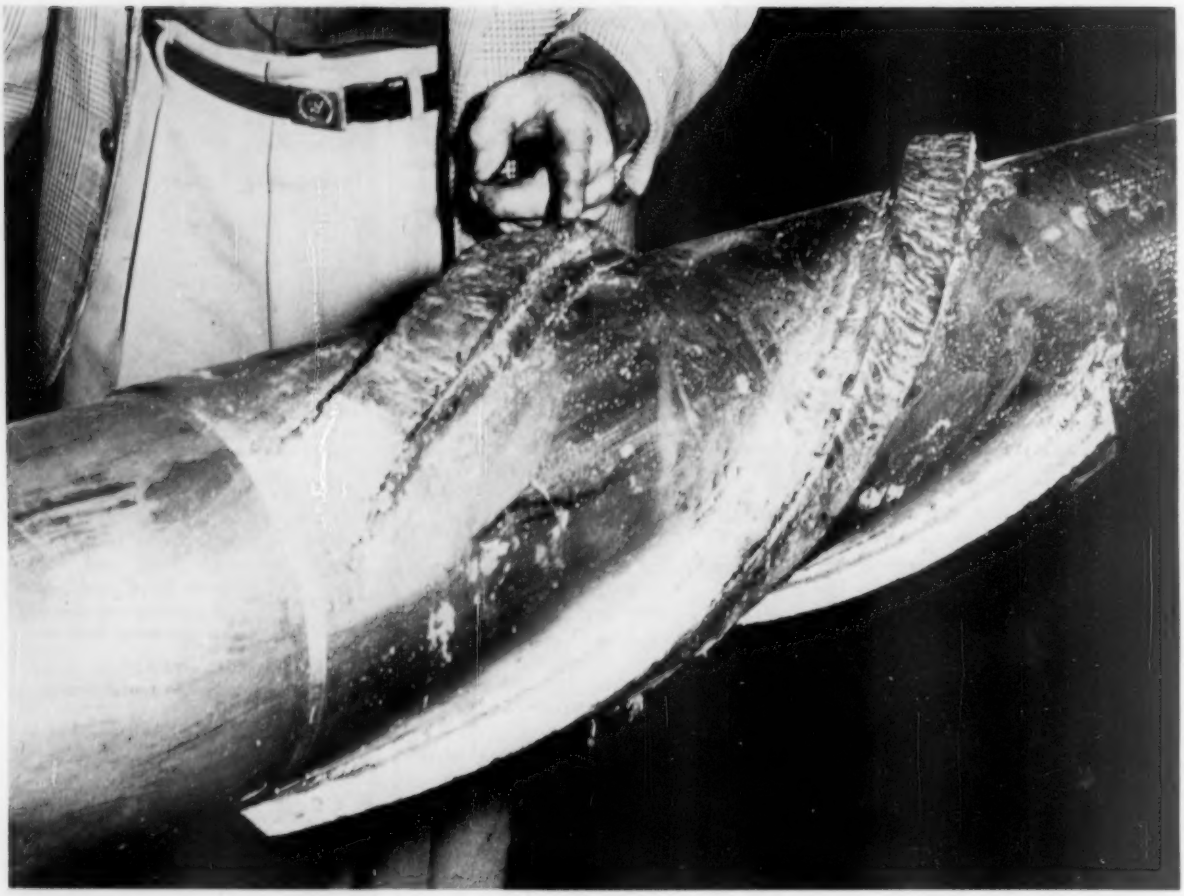
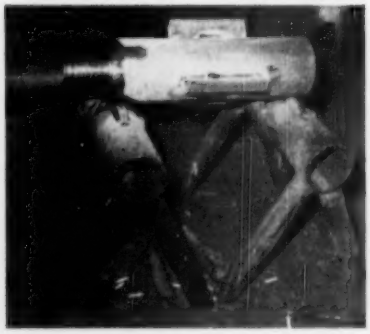


MORE LIFE FROM STABILIZERS

an accepted result with Stoody Tube Borium

Hard-facing of stabilizers is now so commonly accepted that virtually none go in the hole without some form of wear protection. These photos show typical stabilizers manufactured by Ventura Tool Company which fulfill a long and useful life when protected with Tube Borium.

Stabilizer wings are welded to body, can be easily removed with cutting torch for replacements.



Variation in stabilizer construction. Outer faces of these wings are also hard-faced with Tube Borium.

The helical stabilizers are cut from 2" thick flat plate. Strips 2" wide are tack welded at their base to the body. By torch heating, the strips are then gradually forged to the body contour and welded.

Only the outer faces of the stabilizer elements are hard-faced. About 4 lbs. of Tube Borium were used to completely protect this 10⅜" O.D. stabilizer.

When the spirals are finally worn below gauge, they are removed with a cutting torch. New strips are then welded in place and similarly hard-faced.

So standard is the use of Tube Borium in applications such as this, that comparative wear records are seldom kept…a confidence backed up by Tube Borium's unmatched efficiency where severest abrasion is encountered!

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. . . What's New in Equipment?

Use the handy Time-Saver Cards ✓✓✓ to obtain additional information on these items

by Dan B. Miller

Crew Boat is of All-Steel Construction

A new, 51-ft., twin-screw, diesel-powered crew boat is of all-welded-steel construction and was designed to withstand the rugged performance demanded by the oil industry.

Designed primarily to taxi personnel to and from drilling operations located offshore, the crew boat is Coast Guard approved for carrying passengers for hire and is built to the standards of the American Bureau of Shipping. It has a maximum speed of 22 m.p.h.

Dimensions are: length over-all 51 ft. 4 in.; beam 14 ft.; depth molded 7 ft. The draft when loaded is 3 ft. 9 in. and displacement is 54,000 lb. Propulsion is furnished by two General Motors six-cylinder 2-cycle marine diesel engines of the 110 series. These develop a maximum of 300 hp. each at 2,100 r.p.m.

The bottom is metallized and the entire hull in and out is sandblasted to remove mill scale and slag. The engines can be removed in a matter of hours and engine noise is kept to an absolute minimum. The engine compartment is insulated throughout by acoustic deadener. *Equitable Equipment Co., Inc.*

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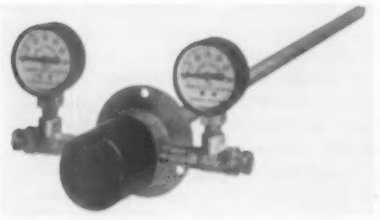

Limitem Is Designed For Precision Regulation

A new and inexpensive nonbleed pneumatic temperature control is now available for operation of such devices as diaphragm valves, damper motors, and other types of control equipment. Known as the Powers Limitem, it is a differential expansion-type control designed for precision regulation of heating, cooling, dew-point control, and industrial processes.

Temperature range of the control is from 35° to 135° F. The concealed graduated dial permits quick, easy adjustment. Sensitivity can be adjusted from ⅛ to 2 psi. per 1° of temperature change.

Body o.d. is 1¾ in. and averaging bulb length is 18 in. with ⅜-in. pipe or flange connection. Simple design and rugged construction provide dependable operation. Available with direct action only. Passage of air pressure is increased as temperature rises. *The Powers Regulator Co.*

Check No. 2 On The Time-Saver Card

Marine Products Introduces Portable Centrifugal Pump

The new Flomax 10 self-priming centrifugal pump is rated with maximum capacity of 10,980 gal. per hour. The iron unit, powered by a Wisconsin AKN engine and mounted in a protective carrying frame, weighs 151 lb.

Flomax 10 utilizes a new type of superhard mechanical seal requiring no maintenance. The pump incorporates the open-adaptor construction. This construction provides readily visual inspection, ample free-working space,

and protection to the engine from stray pumpage.

Of special interest is the fact that pump efficiency is at such a high level that the loss of engine speed is less than 80 r.p.m. over the entire flow range. The Flomax 10 is readily available in cast-iron construction for erosion resistance, and all-bronze construction for corrosion resistance. *Marine Products Co.*

Check No. 3 On The Time-Saver Card

●

Acid-Resistant Packing Made of Coated White Fiber

Known as R/M No. 1307, a new acid-resisting, compressed-asbestos, sheet packing is made of selected white asbestos fibers completely impregnated and coated with an acid-resisting compound developed from a basic formula.

What's New... Use the handy Time-Saver Cards

Gaskets cut from R/M No. 1307 will not be as fragile or brittle as those made from sheets using blue asbestos fibers, because it has higher tensile strength and better flexibility. Processing is also relatively easy. R/M No. 1307 is recommended for use against sulfuric, nitric, and other acids in various concentrations where a tight seal in flanges is necessary, and for temperatures up to 400° F. *Packing Division, Raybestos-Manhattan, Inc.*

Check No. 4 On The Time-Saver Card

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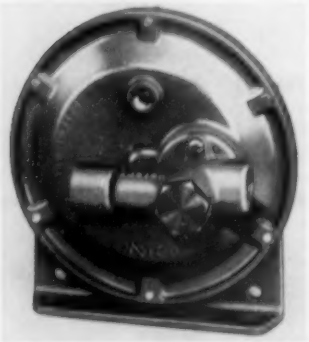


Shutoff Valve for L.P.G. Engines Is Automatic

A vacuum-controlled automatic-shutoff valve for stationary and mobile L.P.G.-engine installations will shut fuel off the instant motor stops, thus offering positive protection in case of line leakage. It contains no electrical connections.

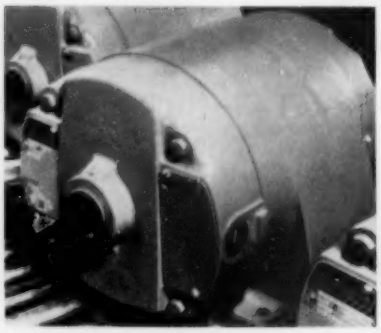
The automatic safety shutoff valve consists of a vacuum-controlled diaphragm shutoff valve actuated by manifold vacuum. When the engine is shut off or if the engine fails for any reason, the manifold vacuum ceases and the valve closes instantly. The valve may be installed in vertical or horizontal position at the tank or at the L.P.G. vaporizer. Only 2 to 6 in. of water-column-manifold vacuum are required to operate the valve. *Ensign Carburetor Co.*

Check No. 5 On The Time-Saver Card

●

New G. E. Motor Features High Speed, Capacity

A complete new line of Tri-Clad "55" single-phase capacitor motors features higher full-load speeds, higher overload capacity, and higher breakdown torque.



Starting of the motor is accomplished by a simple centrifugal mechanism which throws out when the motor is up to speed, disconnecting the starting capacitors and switching the windings from starting to running condition. The transfer switch is a totally enclosed, snap-action switch with contact protected from foreign matter to assure positive contact.

A fiber terminal board is easily accessible behind a cover plate at one end of the motor. By reconnecting the leads, the single-phase motor can be changed from 115-volt 60-cycle to 230-volt 60-cycle operation, and by interchanging two leads, motor rotation can be reversed.

The motor is available in 1 to 5 hp. and in the standard, foot-mounting, and in vertical, D-flange and C-face, close-coupled pump, or resilient-base mounting. All of these, in turn, are available in either the standard dripproof enclosure or the totally enclosed, fan-cooled enclosure for application where the motor will encounter severe contamination or weather conditions. *General Electric Co.*

Check No. 6 On The Time-Saver Card

●

Signalite Watches Mud-Pit Level and Volume in Lines

Mud Signalite enables driller to keep constant watch on level of mud pits; volume of flow in lines. The instrument enables driller to tell at glance how the mud system stands. Equipment consist of panel of microswitches, a bell that sounds when mud pressure drops or when level in pits gets below a certain point.

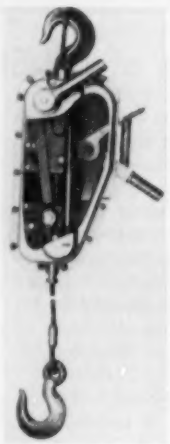
Mud Signalite is tied into a specially designed switch that is activated by a float in pits. The switch is mounted in coupling between the bell nipple and shale shaker on the mud line. If mud level falls or volume decreases suddenly, the lights flash, and the bell rings. Bell can be silenced at driller's option. Equipment resets itself once warning has been sounded. Available for rental. *Mud Signalite Rental Co.*

Check No. 7 On The Time-Saver Card

●

Hoisting Device Permits Use of Unlimited Cable

Tirfor Griphoist is a manually-operated, portable, hoisting or pulling device. Its light weight, 42 lb., permits the machine to be carried, set up, and operated by one man. Wire rope, ½-in. diameter, passes through the machine in a straight line and does not reel or spool inside the machine. This feature permits cable of unlimited length to be used.



The machine is conservatively rated at 3,300 lb. on a single line. By two-parting the line, it becomes a 3-ton hoist. With the use of multiplying sheaves, loads of 6 to 10 tons can be handled.

The design combines a crank and cam mechanism. Two pairs of forged-steel jaws grip and pull the cable. One of the operating levers is keyed to the crankshaft. A push-pull motion on this lever closes one pair of jaws and pulls them backward. At the same time the second set of jaws are opened and slide forward to repeat the gripping and pulling cycle. The other lever is used to lower the load or release the cable tension. This is done by the same opening, sliding forward, and closing of the jaws. A telescopic handle supplied with the machine slips on the operating levers. At the nominal load of 3,300 lb., a force of 77 lb. is required on the handle.

The load is automatically and securely held whenever the motion on the handle is stopped. At full load,

speeds of 10 ft. per minute cable travel can be obtained. The load can also be controlled in either direction to thousandths of an inch, a very important feature when the machine is used for machinery erection.

The cable gripping jaws are smooth and their 4⅛-in. length provides a large bearing area that not only assures a positive grip, but also practically eliminates cable wear. The jaw motion is such that the cable is firmly gripped before the pulling cycle begins.

The Griphoist is normally supplied with 60 ft. of ½-in. preformed, galvanized wire rope. A point is brazed on one end for easy entry through the jaws and a hook is fastened to the other end. *Griphoist, Inc.*

Check No. 8 On The Time-Saver Card

●

Unimatic Hook Includes Proven Hook Positioner

The new Unimatic hook, a short, space-saving model, incorporating a hook positioner, is now in production in 125 and 200-ton models.

The hook positioner feature automatically rotates the elevator into the correct position for the derrick man to catch the next stand while going into the hole. The positioner consists of a cam follower which travels on a flame-hardened cam track. The cam-follower arm may be set and locked at any desired angular position with respect to the traveling block. Whenever the load is released from the hook, the cam follower automatically rotates the hook body and positions the elevator for the derrick man.

The Unimatic also includes an hydraulic shock absorber to minimize impact loading while picking up drill pipe and also to prevent damage caused by bounding when "jumping out" stands while coming out of the hole.

Another feature of this new tool is the flexible connection between the block and the hook. In place of the usual rigid connection, a hinged joint is provided at right angles to the center pin of the block. Thus when the block leans while accelerating or decelerating, it will not swing the hook, links, or elevator off center.

Unimatic hooks can be produced with regular bail and adapter for conventional connection or for close-coupled direct connection to many standard blocks. *Byron Jackson Co.*

Check No. 9 On The Time-Saver Card

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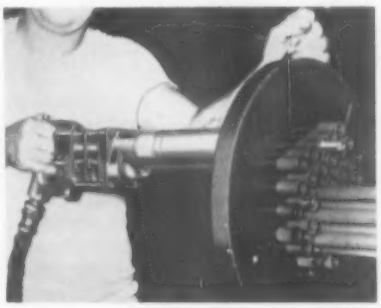

Tube Cutter Removes Damaged Tubes Rapidly

A new internal tube cutter, lightweight in design and fast in operation will solve a widespread need for an accurate, fast-cutting tool to remove damaged or leaky tubes from condensers and heat exchangers.

Precision-made of heat-treated-alloy steel, and featuring tough, tool-steel double cutters, which are easily replaced when worn, the tube cutter is inserted in the tube and quickly cuts the tube behind the tube sheet. Tube-removal tools are then used to knock out and remove the remaining portion of the tube in the header.

The internal tube cutter is self-centering and is powered by an air-driven motor. An additional feature is its positive feed by lever-action control.

This tube cutter will cut steel and nonferrous condenser tubes from ⅝ in. to 1 in. o.d., and can be used through tube sheet thicknesses of 1 in. to 4 in. The ball-bearing collar, which prevents friction, is adjustable for various tube-sheet thicknesses. *The Airetool Manufacturing Co.*

Check No. 10 On The Time-Saver Card

●

Submersible Pump Is Designed for Deep Wells

The Peerless dynamatic submersible pump is designed for deep wells to 280 ft. and for providing capacities up to 940 gal. per hour from the shallower settings. It is available in ½, ¾ and 1 hp. models.

The new pump consists essentially of a sealed-for-life submersible-pump motor and a powerful multistage turbine pump with dynamatic impellers and smooth-water passages. Complete protection to the electric cable of the submersible-pump motor is provided by placing the cable inside the casing sleeve. This design feature not only obviates exposing the cable to wear at the point where the pump would rub it against the well casing, but permits the use of larger diameter impellers, resulting in increased ease of handling and optimum performance in the well.

Three-point bearing construction with bearing supports at top, bottom, and middle of the multistage pump, results in more stable pump operation and less impeller-shaft vibration. Other features include: nonreversing protection, impregnated synthetic electric cable, fully enclosed impellers, and its once-primed, always-primed feature. *Peerless Pump Division, Food Machinery & Chemical Corp.*

Check No. 11 On The Time-Saver Card

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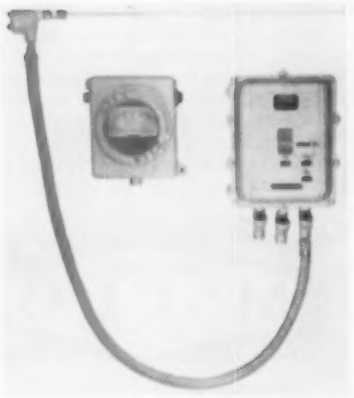

Explosionproof Indicators Are for Hazardous Areas

Electronic level indicators in explosionproof cases are available for installation in hazardous areas. Explosionproof Telstors have been produced to meet requirements of the National Electrical Code, Article 500, in Class I, Groups C and D, and Class II, Groups E, F, and G.

Explosionproof Telstors are available in several combinations suitable for many different industrial and laboratory applications. They employ the standard Telstor continuous level indicator, which is a dependable one-tube, electronic unit for measuring mass, level of liquids, viscous fluids or powders, and granular solids, regardless of whether they are conducting or nonconducting. Easily installed, the Telstor contains no moving parts that might clog or cause inaccuracies. *Fielden Instrument Division, Robertshaw-Fulton Controls Co.*

Check No. 12 On The Time-Saver Card

It's a lot more fun to sell Web Wilson Oil Tools, which always seem to get a majority of the votes. ★ I'm sure that new HYDRA HOOK is going to be an Ambassador of Good Will in every overseas oil field, just as soon as operators know **how good it really is.** ★ And those new Web Wilson Drill Pipe Slips with the **buttons that won't slip** are really something you should know about. ★ Why not call H. E. Maland (he's one of Bob Eiche's boys known as Herb) at Worth 4-3980, or drop by at Room 314, 30 Church Street, New York City, and find out what's new. ★ He'll be glad to see you.

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- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

The Uniflux Tray. A four-page illustrated Bulletin No. 10-M describes the Uniflux tray, licensed to manufacture and sell by the designer and owner of the patents, Socony-Vacuum Oil Co., Inc., New York. Briefly, the Uniflux tray is a new type of removable-section bubble tray of simple design, permitting high capacity at low cost. Tray parts are so proportioned as to provide available slot area from 12 to 14 per cent of the superficial tower area. Running slot submergence is uniform across the tray. Riser area is larger than with bubble-cap trays. Reversal area and equivalent annular are large, too. *Badger Manufacturing Co.*

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●

Zublin Drain Holes. This multicolor foldout offers an introduction to drain-hole drilling and describes it as the most effective method to increase oil production. The bulletin discusses both the method and equipment used. Charts depict three types of drain holes required for three different well conditions. *Universal Engineering Co.*

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●

Propeller Pumps. A new four-page pamphlet has recently been published on Class BPM mixed-flow and APL axial-flow pumps. It incorporates dimensions, a materials table, and sectional drawings showing the features of the pumps with detailed explanations of each. These units, specially designed for a wide range of process industry applications, are now available in sizes 10 to 24 in. with pressures to 25 psi. and capacities to 16,000 g.p.m. *Ingersoll-Rand Co.*

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●

New Process Unlocks Oil Worth Billions. The story of the world's largest waterflood, including 24 color photographs and diagrams, is published in the August-September issue of Gates Industrial News. Quick facts about the North Burbank water flood are tabulated on the front page. A map of Osage County shows the outlines of the project and photographs depict the equipment used. *The Gates Rubber Co.*

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●

Proportioning Pumps. A six-page bulletin describes the Hills-McCannameter, a new-type proportioning pump with no packing, high-speed valves and pulse-free flow. The new bulletin, printed in color, tells what the Hills-McCannameter is; why it was designed; what it will do; and how it works. *Hills-McCanna Co.*

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●

Bucyrus-Erie's Products Catalog. General Catalog GC-5A, describes the company's complete line of excavating, drilling, and material-handling equipment. Designed for quick reading, the 70-page, 2-color catalog features concise copy, condensed specifications, and over 100 photo-illustrations of Bucyrus-Erie machines on specific jobs. *Bucyrus-Erie Co.*

Check No. 18 On The Time-Saver Card

●

Pneumatic Emplacement of Refractories Products. Various uses of castable refractories to contain and control heat in refinery vessels is featured in an eight-page brochure. A detailed chart shows technical information on heavy and lightweight castables for use on catalyst regenerators, vertical and horizontal heaters, vapor separators, breeching, transfer lines, cyclones, stacks, and special equipment. Steps of pneumatic application of refractory castables are illustrated with information on both wet and dry emplacement guns. *Mexico Refractories Co.*

Check No. 19 On The Time-Saver Card

●

Hydramotor Valves. The applications of electrohydraulic motor valves in automatic control of process streams are treated in this new catalog. Cost savings, plant illustrations, and engineer's drawings combine to give the engineer necessary buying information. *General Controls.*

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●

Norris Quality Tubular Products, a 20-page catalog covers bull plugs, concentric and eccentric swaged nipples; refinery swaged nipples and bull plugs; concentric and eccentric welding reducers; welding caps; adaptor nipples;

casing, tubing, choke, boiler, and perforated tubing nipples; mercury traps, condensate chambers; line couplings; upset and plain tubing couplings; and casing and tubing weights and mill-test pressures. *W. C. Norris, Manufacturer, Inc.*

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●

Consolidated Systems Engineering. Custom engineering of electronic instrumentation, tailored to specific industrial needs, is the subject of a colorful 16-page brochure. Bulletin CEC-1304 describes the role of the systems division of an instrument company in assisting plant-design engineers. Case histories of typical instrumentation systems are included. *Consolidated Engineering Corp.*

Check No. 22 On The Time-Saver Card

●

United States Steel Presents T-1. Carilloy T-1 steel, a new engineering material that combines toughness with high strength, is detailed in the new 46-page USS Publication ACVL-317-54. The new steel has three times the yield strength of ordinary steel, is readily weldable without preheating or stress relieving, is exceptionally tough even at subzero temperatures, and demonstrates outstanding resistance to the combination of impact abuse and abrasion. Recommended applications include pressure and storage vessels, line pipe, flanges, fittings, heavy machinery, scraper blades, and tower components among many others. Complete physical, and chemical, and mechanical properties are outlined in data tables. *United States Steel.*

Check No. 23 On The Time-Saver Card

●

Mud Tachometer. Bulletin P-7 describes a pump-stroke-and-volume indicator, a gage that tells the driller the r.p.m. of the mud pump and the optimum-mud output at each speed and for each liner size. The literature features information regarding the instrument's ability to furnish necessary data, particularly for deep-drilling operations. *Martin-Decker Corp.*

Check No. 24 On The Time-Saver Card

●

Abridged Pump Catalog. A pocket-size, illustrated booklet presents a line of centrifugal, rotary, reciprocating, and vacuum pumps for a broad variety of industrial needs. It also describes water-purification and filteration equipment. *The Pulsometer Engineering Co., Ltd.*

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DISTRIBUTOR Inc. — and Refinery Supplies
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THE OHIO INJECTOR COMPANY
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DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

STEEL FORGINGS, INC.
Shreveport, La.
Weld Saddles.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

EQUIPMENT MEN . . . in the News

Jones & Laughlin Opens New Odessa Store

Jones & Laughlin's new store at Odessa.

Jones & Laughlin Steel Corp., supply division, has opened a new store in Odessa, Tex. The main building has 15,727 sq. ft. of floor space. A private spur from Texas & Pacific tracks leads directly past a concrete loading dock into a steel warehouse with 5,000 sq. ft. of unobstructed floor space. The concrete floor is truck-bed high for one level unloading, storing, and shipping.

The Odessa store is 1 of 10 J.&L. stores in the company's West Texas district under the supervision of District Sales Manager F. L. McFarland, headquartered in J.&L.'s office at Midland, Tex.

Store personnel are: E. G. Purman, store manager; C. W. Moore, E. R. Stice, J. W. Johnson, R. D. Landis, G. H. Garms, salesmen; H. P. Lockett, J. L. Chesser, James Boggs, R. L. Hicks, W. L. Harris, and L. C. Odell, Jr., storemen.

D. F. Ferguson Joins Refinery Engineering

Donald F. Ferguson has been appointed process engineer for Refinery Engineering Co., according to an announcement by T. M. Lumly, president of the company. Ferguson joined the process department of TRECO on October 4.

Before joining the TRECO organization, Ferguson served as design and process-project engineer in the process department of Eastern States Petroleum Co., Houston. Prior to working in that company's process department, he was an analytical chemist in its Houston laboratory.

Oilwell's Rocky Mountain Area Announces Changes

Clair Haas has been named manager of Oilwell's Williston, N. D., store and George H. Fletcher has been appointed field representative at Fort Morgan, Colo., for Oilwell, as announced by R. L. Armstrong, manager of Oilwell's Rocky Mountain area.

Haas, a veteran of almost 19 years' service with U. S. Steel's Oil Well Supply Division, has performed duties as manager of Oilwell stores at Albany, Tex.; Powell, Wyo.; as well as Cut Bank and Glendive, Mont.

McCullough Appoints Two To Mountain Division Posts

Appointments of G. D. Wiley and W. P. Maurath to sales engineers in the Mountain Division area have been announced by I. J. McCullough, president of McCullough Tool Co.

G. D. WILEY

W. P. MAURATH

Wiley will be working out of McCullough's Vernal, Utah, service branch. He had been employed by Baroid Sales Division in the well-logging department in the Mid-Continent and Rocky Mountain areas for 6 years before joining McCullough's sales organization.

Maurath has been assigned to the recently opened Cody, Wyo., branch. He has a 13-year oil-field background, having been employed by McCullough since 1941. Prior to his appointment as sales engineer, Maurath had been in McCullough's service department with extensive experience in line-truck and logging operations.

Gustin-Bacon Names Pipe Insulation Sales Manager

The appointment of F. W. Muller as manager of G-B snap-on pipe insulation sales has been announced by Gustin-Bacon Manufacturing Co., manufacturers of glass-fiber insulations. In the newly created department, Muller will direct national sales from the Kansas City headquarters.

G-B snap-on pipe insulation is Gustin-Bacon's most recent addition to their rapidly expanding group of glass-fiber insulating materials. The new product, made in cylinders with a single slit, possesses characteristics that enable it to be snapped over heated and cold piping. Thermal efficiency and application costs are outstanding.

Muller comes to Gustin-Bacon with 14 years' experience in the thermal-insulation field. He was formerly manager of high-temperature insulation sales for Armstrong Cork Co.

Two-Way Radio Featured at New Mid-Continent Store

President Ken W. Davis of Mid-Continent Supply Co., has announced the recent opening of a new store in Andrews, Tex. Two-way radio is featured in this store as a part of Mid-Continent's West Texas-New Mexico radio network.

W. D. Purtell is store manager at

District Manager C. H. Hickman, Division Manager W. W. Arnold, and Store Manager W. D. Purtell of Mid-Continent Supply Co.'s newest oil-field supply store.

the Andrews location. B. G. Simpson and F. D. Groves are field salesmen. Other personnel include A. C. Morelli, R. L. Noh, B. F. Norman, and H. J. Morton.

Division manager for the Andrews store is W. W. Arnold, whose offices are in Midland, Tex. District manager is C. H. Hickman with headquarters in Odessa, Tex.

Bowen to Represent Well Equipment in Corpus Christi

Mack M. Bowen has been appointed sales representative at Corpus Christi, Tex., by Rector Well Equipment Co., Inc. With the exception of 2 years in the Armed Services, Bowen has been doing oil-industry sales and service work in the South Texas area for the past 6 years.

Bowen's addition to the Corpus Christi sales staff is a result of Rector's increasing volume of business in the Corpus Christi area, combined with an expansion of the company's activities in South Texas.

Axelson Names Advertising, Public Relations Director

B. E. ELLITHORPE

Bruce E. Ellithorpe has been appointed director of advertising and public relations by W. W. Greenway, vice president of Pressed Steel Car Co., general manager of the Axelson Manufacturing Co. In this capacity, he will be responsible for Axelson's four divisions: petroleum equipment, lathes, aircraft components, and foundry.

Ellithorpe was formerly associated with Grant Advertising Agency, in Chicago and New York City, as an account executive, and previously with Marlin Electric Co., Chicago, as sales manager.

Empire Oil Corp. Moves

Offices of Empire Oil Corp. have been moved from the Mayo Building, Tulsa, to the Kennedy Building, Tulsa.

The move was necessary in order to obtain needed additional space. S. Laurence Sobel is president of Empire Oil Corp.

New Corrosion Service Firm Opens in Tulsa

TITTERINGTON

Corrosion Services, Inc., a newly incorporated Oklahoma company, has recently opened a plant and offices on Sand Springs Road in Tulsa.

The company, staffed by a number of veterans in the corrosion-control industry, will distribute a number of nationally known products for corrosion mitigation. They will distribute a complete line of magnesium anodes produced by The Dow Chemical Co., Cadwell equipment and instruments, and auxiliary equipment for corrosion mitigation. The company will also serve as a consulting service on corrosion problems to industry throughout the United States.

General manager of the new company will be Yale W. Titterington, former corrosion engineer with the Texas division of Dow, and Dowell Incorporated. Vice President and Chief Engineer Hugh Brady served as corrosion engineer with Gulf Oil Corp.,

GLITSCH
LARGE...
OR SMALL . . .
TRAYS
Simple and adaptable in design, GLITSCH "Truss-Type" lightweight trays can be designed for any process requirement with respect to tray size, process layout, type of flow, type and shape of downcomer, weirs, wells, and size and shape bubble caps as well as suitable corrosion resistant materials.
GLITSCH BUBBLE CAPS
Dies for 287 different cap and riser assemblies are now available. The cap styles can be varied further by a wide range of slots. Holddown styles simplify clean-outs, reduce "off-stream" time to a minimum.
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FRITZ W. GLITSCH & SONS, INC.
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Your engineering staff can effect definite savings in initial designing by utilizing GLITSCH world-wide experience in plans, design and fabrication of tower internals. Cost analyses are available promptly.
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prior to joining Corrosion Services. He will be responsible for contracting and installation work as well as the consulting division. Hartley Davis, treasurer and office manager of the company, has a background of experience in magnesium and corrosion-control work.

Titterington, in his work with Dow, was instrumental in developing the widespread use of magnesium anodes for the cathodic protection of underground pipelines. He has served as an instructor in corrosion short courses for corrosion engineers throughout the country.

Burgess-Manning Names Paddock to Dallas Post

S. G. PADDOCK

S. G. Paddock, formerly sales manager for Dallas division of Burgess-Manning Co., has been named Dallas division manager and director of a new national sales organization, according to an announcement by Ralph L. Leadbetter, company president. Leadbetter was recently appointed president after having served as vice president and Dallas division manager for several years.

Under the new plan, Paddock will direct and correlate sales operations of the company's divisions at Libertyville, Ill., and Dallas, with three primary sales districts covering the entire country. The districts are at Chicago, Dallas, and New York and include related sales operations in each district.

Frank K. Becker, of Dallas, has been named manager of the Dallas

F. K. BECKER

H. L. HARRIS

district, which includes Southwest and southern Far West territories, with sales agencies in Tulsa, Houston, New Orleans, Denver, and Los Angeles. The Dallas district specializes in engineering and service in the petroleum, chemical, and general industrial fields. H. L. Harris has been delegated to assist in Dallas district sales.

H. A. Dietrich has been appointed manager of the Chicago district, which comprises the Middle West and northern Far West, with sales agencies in Detroit; St. Louis; Ames, Iowa; and other cities. As district manager, Dietrich will continue his divisional administrative duties, including direction of advertsing. F. C. Duerr has been assigned to Chicago district sales.

W. A. Carroll, Jr., has been designated district manager of the New York district, comprising the eastern states and the Pittsburgh territory. R. T. Oliver, Jr., has been assigned to New York sales.

Bethlehem Supply Announces Several Personnel Changes

The following changes in personnel have recently been announced by Bethlehem Supply Co.

D. L. Ligon has been promoted to store manager and field representative at the Graham, Tex., store, replacing P. J. (Pat) Ryan. Ligon, formerly field representative at Graham, has been with Bethlehem since 1950.

L. D. Harris has been appointed field representative at the Sterling, Colo., store, where he formerly served as a clerk.

W. J. Overton has recently been employed as a clerk in the tubular-goods section of the general sales office

STEEL "on tap"

for Oil and Gas Industry

When you need steel quickly—whatever the kind and quantity—here's your surest source. Here you draw on the world's largest steel stocks; have at your disposal every kind of equipment for preparing steel to your order. And experienced steel men who know your industry's requirements work with you. So for quick, dependable steel service . . .

call RYERSON

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA CHARLOTTE, N. C. • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

ONE OF A SERIES

OF SHOP TALKS

BY

JOURNAL EDITORS

Why does the Journal have special issues?

Week after week we report fully on every division and activity of the oil and gas industry. Yet 10 or a dozen times a year we put out a big special issue devoted chiefly to one subject.

There's a special reason for each special issue, and each one stands on its own feet.

Our January Review and Forecast issue, for instance, has been a standard reference work for 50 years. Its statistical analyses, detailed tabulations, and forecasts are used as an operating guide by the entire industry.

Likewise, our Midyear Report each July fills the same function. To it we add an engineering reference section, summarizing progress in the industry's technology.

Then each major division of the industry is the subject of a big special some time during the year, such as Refining, Pipeline, Drilling, Exploration, International, and so on. This gives us a chance to round up what's been happening and present more detail than we have space for in the regular weekly issues. It gives the reader a concentration of information between two covers.

Finally, we have occasional issues, based on some event such as the A.P.I. annual meeting, or the International Petroleum Exposition. Now and then we devote a special to a single oil state or region of particular interest. Or again to technological developments of particular current importance in some field such as petrochemistry or field processing.

You see, even though we keep up to date week by week, we all need to stand off from the trees and take a look at the whole forest every so often. Our special issues permit the industry to do this. In them we can include more concentration and specialization, more summaries and recapitulations, more trends and forecasts.

The combination of our regular weekly reporting and our periodic special material gives our readers both current information and that highly necessary analytical long-range view.

THE OIL AND GAS JOURNAL

in Tulsa. Overton will help expediting the handling of pipe and tube orders in the Tulsa sales office.

Catalytic Construction Gets Two Texas Co. Jobs

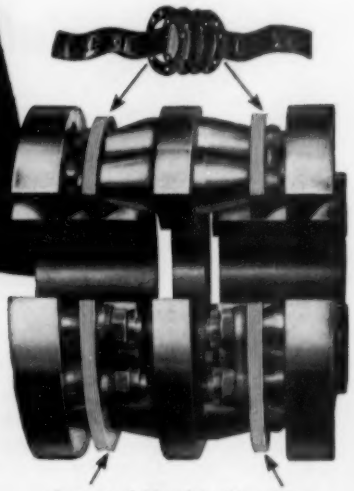
Catalytic Construction Co., Philadelphia, has been awarded two new contracts by The Texas Co. in connection with expansion of the oil company's Eagle Point Works at Westville, N. J.

T. Ellwood Webster, president of Catalytic, stated that one contract is for fabrication, erection, and testing by Catalytic of approximately 23 miles of offsite piping which is to tiein with an alkylation unit now under construction by Catalytic for Texaco at Eagle Point.

Under the second contract Catalytic will construct a new olefin feed-preparation-splitter unit at Westville. This is a fractionation unit which will remove olefins from refinery products and utilize them to feed an alkylation unit that makes high-octane gasoline.

Work on the first contract is now under way and the second is to start shortly. Both are scheduled for completion by December this year.

Specify THOMAS ALL METAL FLEXIBLE COUPLINGS for Power Transmission to avoid Costly Shut-Downs



REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

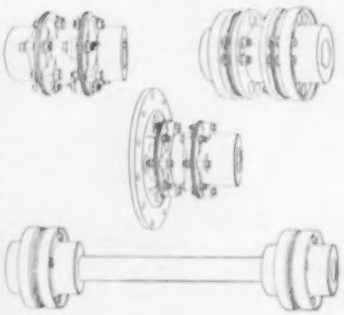
You can use Thomas Couplings to your advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required. Thomas Couplings can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World

WARREN, PENNSYLVANIA, U.S.A.

Davison Appoints Barrett As Sales Manager

D. P. BARRETT

Appointment of David P. Barrett as sales manager of industrial chemicals department, Davison Chemical Co., division of W. R. Grace & Co., has been announced by D. N. Hauseman, vice president of Davison. This appointment fills the vacancy created by the resignation of N. E. Hathaway.

Barrett joined Davison in 1946 as sales trainee in the industrial chemicals department, became a field salesman in the Midwest, and took over the New York sales office in 1949. In 1952 Barrett was made assistant sales manager of industrial chemicals department, which post he held until his promotion.

Haines to Manage Petroleum Sales for Hewitt-Robins

Charles W. Haines has been named manager of petroleum - industry-sales development by Hewitt-Robins, Inc., Stamford, Conn.

He will provide specialized sales assistance and guidance to members of the company's nation-wide field-sales organization calling on the petroleum industry.

Haines has been with Hewitt-Robins for 3 years. Before that he was associated with Shell Oil Co. His office will continue to be located in Stamford.

Blaw-Knox Names Rook As Division General Manager

E. C. ROOK

E. C. Rook has been appointed vice president and general manager of Blaw-Knox equipment division according to an announcement by W. Cordes Snyder, Jr., president of Blaw-Knox Co. Rook succeeds G. L. Dirks, who resigned. The new official immediately assumes the management of the company's largest fabricating unit, which has its main plant at Blawnox, Pa., and a branch plant at Elyria, Ohio.

National Supply Names Two District Managers

Appointment of two new district managers has been announced by The National Supply Co., manufacturer and distributor of oil-field machinery and equipment.

George H. Shumaker will serve in the Michigan district, with headquarters in Mount Pleasant, and R. T. Harris in the Illinois district, with offices in Olney. Roger L. Dailey, recently promoted to division manager of eastern division, previously served as district manager of both districts.

Shumaker joined National Supply in 1938 as a clerk in the Centralia, Ill., store, and was named assistant district manager in 1948.

Harris started at the Clay City, Ill., store in 1939, and was named assistant district manager in 1953.

Gardner-Denver Opens New Dallas Facilities

Gardner-Denver Co., manufacturer of equipment for the oil, mining, and construction industries, has moved into its new unit-fabrication and warehouse building in Dallas, as announced by Gifford V. Leece, president. Built to the company's own specifications, the plant will serve Gardner-Denver's activities in the oil industry.

All of the special units using the company's oil pumps and gas compressors for that vital area of the oil industry will be fabricated according to the customer's requirements at the Dallas plant. In addition, adequate storage facilities exist in the new building for service parts for all of the company's oil-field products.

Brown Joins Peerless As Sales Engineer

The appointment of Edward F. Brown as sales engineer for both Peerless and its subsidiary, Sillers Engineering Co., has been announced by Peerless Manufacturing Co., Dallas. In his new capacity, Brown will handle the expanded sales activities of both companies in the North Texas area, including Dallas and Fort Worth.

Peerless manufactured products include a complete line of liquid-gas separation equipment, gas scrubbers, natural-gas odorization equipment, and automatic engine timers. The Sillers division manufactures the newly designed Flex-Ring Closures, plus other special flange products.

Oil Base Names Four New Distributors

Thad Randolph, vice president in charge of sales for Oil Base, Inc., Compton, Calif., announced the following distributors for Black Magic and White Magic drilling fluids:

Pacific Chemicals, Ltd., Calgary, Alta., one of the leading drilling mud distributors in Canada, will represent Black Magic oil-base drilling fluid and other Oil Base, Inc., products in western Canada. Stan MacKay is in charge.

Black Magic will also be represented in Canada by Clint Buffington, head of Autronics, Ltd., Calgary.

Carl Ingalls Trucking Co., Bakersfield, Calif., will be the exclusive distributor for White Magic emulsion mud throughout the San Joaquin Valley area.

Mojave Corp., Norwalk, Calif., will represent White Magic exclusively in the Los Angeles basin and coastal areas of southern California.

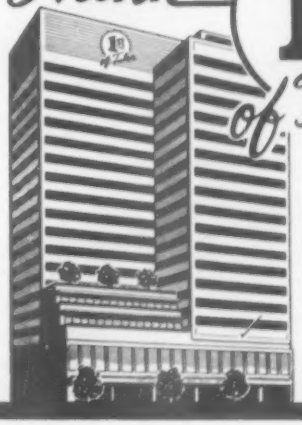
When You Think of Any Kind of Oil Financing

It Pays to

***Think...* FIRST**

One of the largest Oil Credit Files in the Nation — a staff of full time appraisers with over 73 Years Combined Oil Business Experience — 11 Nationally known Oil Men on our board — and 58 years experience as one of the leading Oil Banks in the Nation . . . Let us prove it pays to —

Think 1st *of Tulsa*



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THE FIRST NATIONAL BANK AND TRUST CO.

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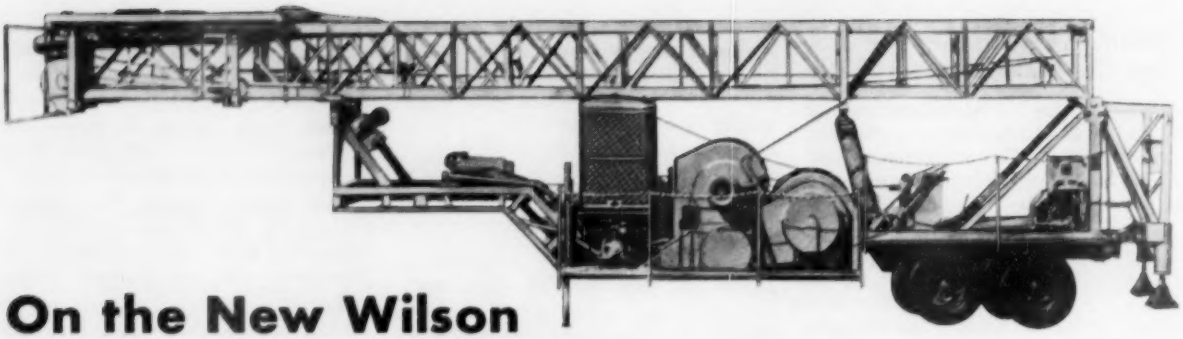

On the New Wilson Mogul Model Double Drum Torcair Rig

DIAMOND ROLLER CHAINS

Whenever Wilson introduces a new rig or winch, you can be sure it's designed and built to give outstanding performance.

You can also be sure that where roller chain is used, it is Diamond. Their high *uniform* quality, year in and year out, unsurpassed efficiency and long life dependability have made them first choice of leading manufacturers and oil men everywhere.

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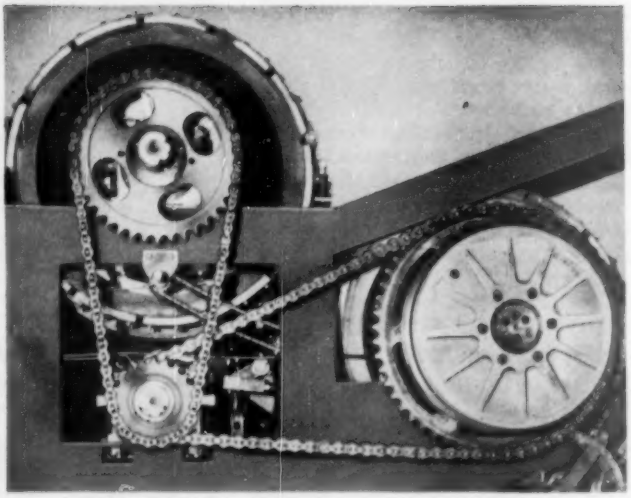
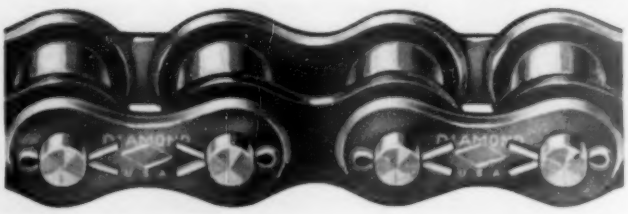
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



One of the Diamond Roller Chain applications on the Wilson Mogul 42 Torcair Double Drum Rig.



DIAMOND ROLLER CHAINS

EXPLORATION

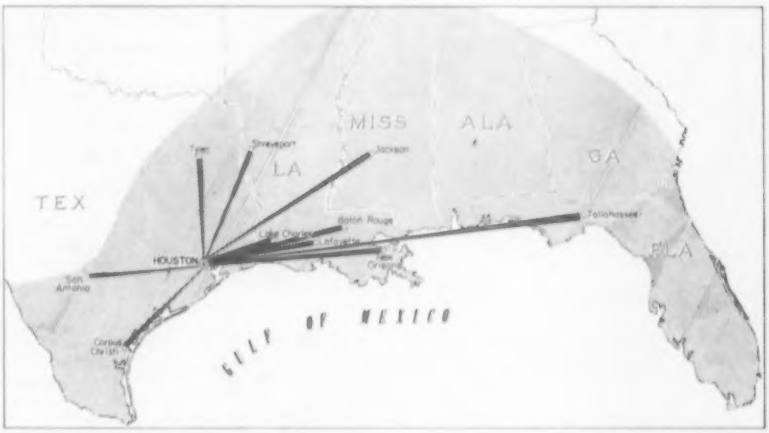
Gulf Coast Geologists Will Take Stock

by Frank J. Gardner

WHAT makes a meeting important, if not the breadth of vision reflected in its program? What makes it interesting, if not the realism of its plan? And what makes it memorable, unless you leave it feeling that you've had a glimpse of things to come and learned some lessons from those things that are done?

An important, interesting, and memorable meeting is going to take place this week, when 2,000 petroleum geologists convene in Houston as delegates to the fourth annual meeting of the Gulf Coast Association of Geological Societies. They will be representing 11 individual geological groups from Tallahassee to Corpus Christi.

Ordinarily, this would be a rather routine annual event, but this is no ordinary group, and these are certainly not ordinary times. These Gulf Coast oil finders are intense, aggressive experts on one of the nation's oldest petroleum provinces, and they are bent upon perpetuating it as one of the great provinces of the future.



Geologists of the Gulf Coast province, representing 11 different societies, will convene in Houston this week to exchange views on exploration issues.

The keynote . . . To set the tone of the gathering, the steering committee has selected L. G. Weeks, chief geologist for Standard Oil Co. (New Jersey). In his keynote talk, entitled "A Geologist Takes Stock," he will reveal current trends of thought among experts on the impending effects of atomic-energy utilization upon the future of petroleum. He will place the geologist in his proper perspective as ". . . the kingpin, the keystone of a great arch involving not only his own but many other industries." He will outline the role of the geologist and his responsibilities in tomorrow's world of petroleum-atomic competition (or, more likely, partnership). The co-responsibilities of the scientist and the public will come under close scrutiny as the speaker pursues the theme of energy unfoldment in years to come.

The program . . . The program of this meeting naturally is heavy with views and reviews of offshore sedimentation and structural problems. Here is a present-day illustration of vast responsibilities having been thrust upon the shoulders of the petroleum geologist. He has been asked to predict the potentialities of the continental shelves, and the expenditure of billions of dollars will hinge upon the strength of his opinions. Thirty years ago, he would have been wary of such predictions; today, fortified with his geophysicist-brother's endeavors, he undertakes the job daringly if guardedly. As the industry approaches a crossroad in the history of energy fuels, these offshore reserves may become more economic than they appear to be today, and their exploitation may become a dire necessity in supplying the energy requirements of the petroleum-atomic world.

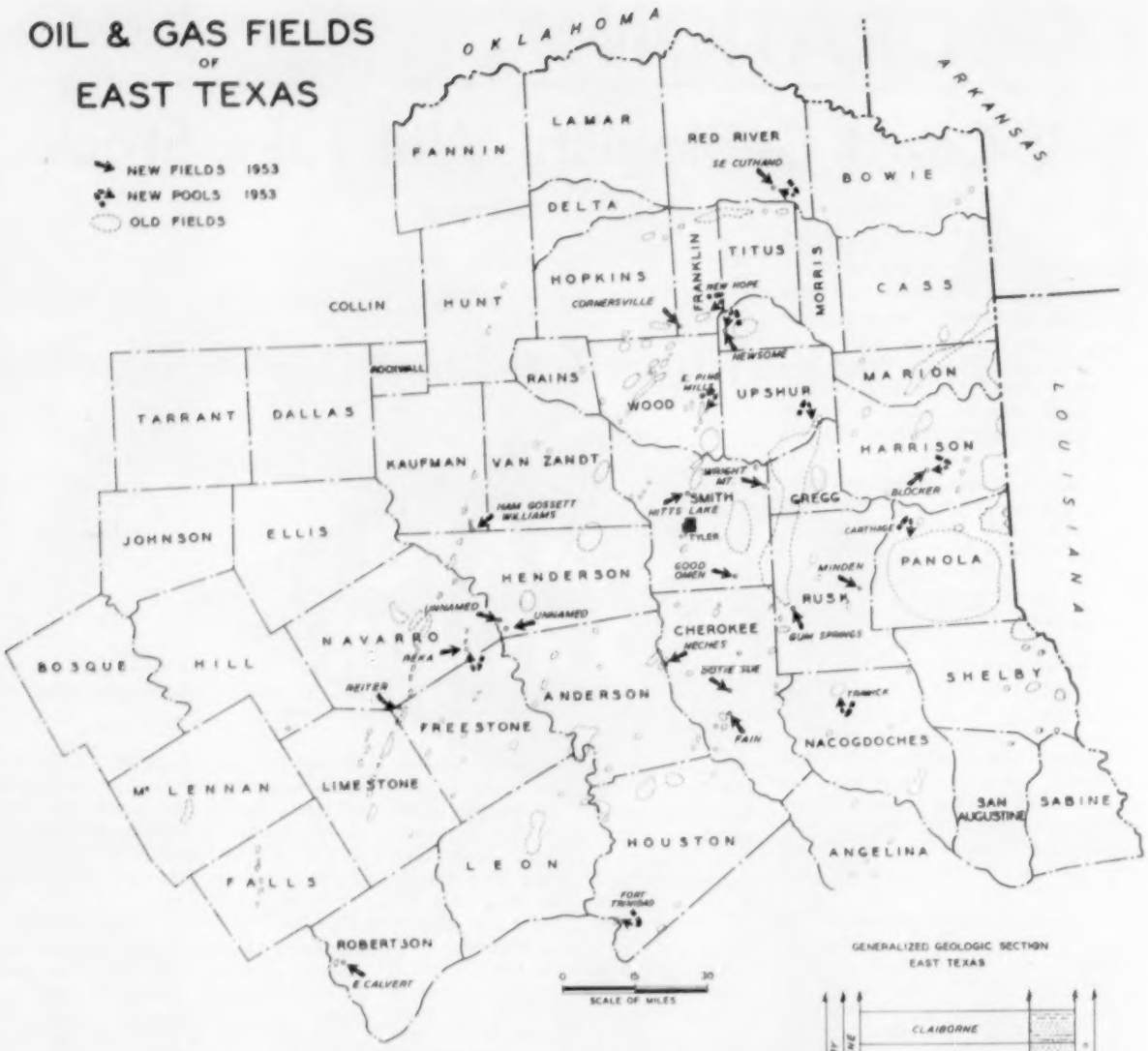
The third prominent subject at the Houston meeting is stratigraphy and sedimentation of the onshore province. As structural traps become ever harder to find, and strat traps begin to dominate the industry's exploration and development programs, stratigraphic and sedimentary studies must occupy more and more of the geologist's attention. "All I can sell is wiggles," laments one consultant, ". . . I know this trap is there, but it's a wedge, and all the operator will buy is a wiggle." The day will come when a wedge will sell as well as a wiggle, but to accomplish the sale, the geologist must have the strength of his own good judgment and the courage of his convictions, based on sound foundations of study.

In the past, the geologist has been a notoriously poor salesman, content to patiently await the eventual confirmation of his theories and ideas. Perhaps this stems from the very nature of his science, couched as it is in eons of time. But in the world that lies ahead, a sense of urgency will compel him to push his theories to realization if the energy demands of that world are to be met by oil.

The atmosphere . . . These men will be meeting in a new atmosphere of conjecture about the destiny of the industry they have helped to create—an atmosphere that is permeated by talk of the impending dethronement of petroleum as king of energy in the world. They will be meeting in an atmosphere of challenge—a challenge of more immediate concern, presented by the emergence of the continental shelves as a new and exciting frontier for submarine exploration.

But geologists are also notorious as conjecturers and they are past masters at accepting a challenge. For 50 years, they have probed the earth and made it give up its petroleum stores; with the support of capital, research, and mechano-chemical skills, they have provided the world with vast amounts of energy and have led it through an industrial revolution. Of all the oil recovered to date, 98 per cent has been produced within those 50 years. It's an astonishing record, attributable only to the efforts of the petroleum geologist.

It will be a meeting of importance. It will be interesting. And the program confirms that it will be memorable.



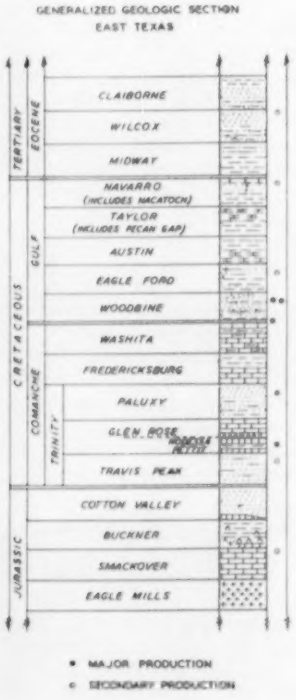


Fig. 1—East Texas has attracted both majors and independents because of the shallow producing zones and the favorable lease situation.

A Look at East Texas

. . . It's had a hectic history and it has a promising future, this author believes

by J. P. O'Connor

THE East Texas area (Fig. 1, after Hunt and O'Connor, 1954) can perhaps be compared to the small brother of an All American fullback . . . he stands in the shadow of greatness and basks in reflected glory, but his own future exploits will forever be dimmed.

The author is a subsurface geologist with Shell Oil Co., in Tyler, Tex.

A similar analogy between East Texas and East Texas field is unknowingly made by many who have been blinded by the magnitude of the Americas' largest field. This viewpoint cannot easily be condemned. No other field has had such an immediate impact and lasting influence not only upon the oil industry but also the eco-

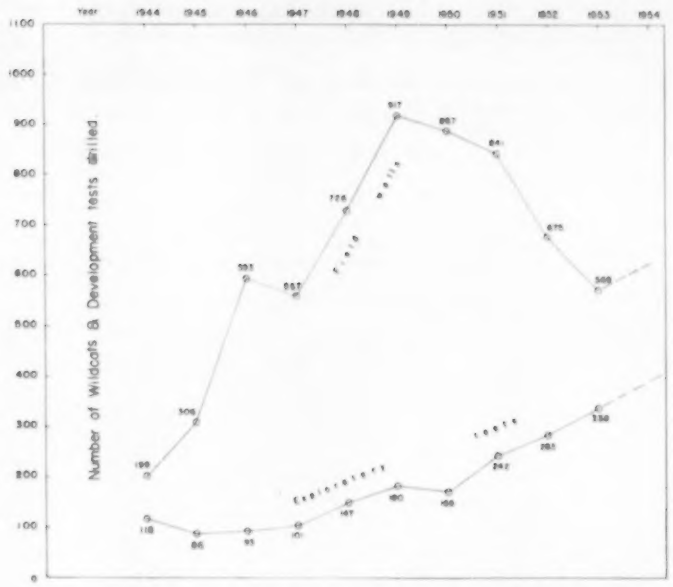


Fig. 2—The number of exploratory tests in East Texas is steadily increasing from year to year. The majority of these are shallow tests aimed at finding Woodbine production.

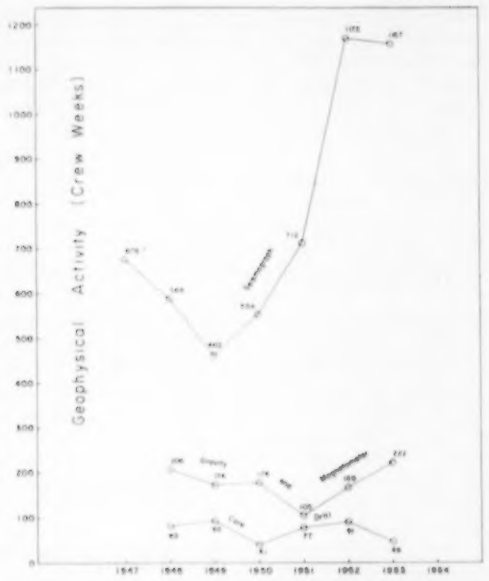


Fig. 3—Geophysical activities in the past 6 years have nearly tripled in East Texas. Many of the recent discoveries can be attributed to this accelerated program.

nomic and social facets of the American people.

On October 3, 1930, the discovery well of East Texas field, 3 Daisy Bradford, was completed flowing 300 bbl. of oil per day. To C. M. Joiner, discoverer of East Texas field, this successful completion followed 2½ years of disappointments. Joiner's first two tests had been junked and abandoned before reaching the Woodbine sand. Subsequent development and exploitation occurred in such rapid and uncontrollable fashion that the flood of oil, from this seemingly endless reservoir, occasioned the collapse of oil-price structure in the United States.

Today, operating under conditions designed to recover the utmost in ultimate production, the field is under leash. Its size, 43 miles in length with an average width of 5 miles, is difficult to comprehend. In excess of 3,100,000,000 bbl. of oil has been produced with conservative reserve estimates averaging 2,500,000,000 bbl.

Early history . . . There are many who believe that East Texas is the true birthplace of the oil industry in the United States. Oil was utilized locally and even exported from Nacogdoches "oil spring," Nacogdoches County, as early as 1832. A test drilled in 1866 is credited with being the first oil producer in Texas and the discovery well of Nacogdoches field. Completion was effected in sand lenses in the Mount Selman formation of the Claiborne group. Until its eventual abandonment 60 years later, this field produced approximately 500,000 bbl. of oil.

In 1894 oil was encountered by operators, in search of an additional municipal water supply, in the city of Corsicana, Navarro County. It was not, however, until 1920 that a Woodbine test was drilled on the crest of the Mexia "anticline." This test was completed pumping 150 bbl. of oil per day from the Woodbine sand and marked the first production from one of the world's most prolific petroleum reservoirs. Several wells were completed before the faulting, now recognized as controlling the accumulation, was accorded full significance.

In 1927 a discovery was made which diverted attention away from the fault line and toward the East Texas embayment area. Humble Oil & Refining Co. 1 Elliott & Clark encountered 8 ft. of oil-saturated Woodbine sand on the east flank of Boggy Creek salt dome, western Cherokee County. A period of intensive exploration followed during which many basin fields were discovered. It is a point of interest that to date Boggy Creek is the only shallow piercement-type salt dome in East Texas which produces oil in commercial quantity.

One of the major discoveries from a reserve standpoint, and the "confirmation" for the East Texas basin, was on the Van structure in eastern Van Zandt County. It is anticipated that the ultimate production at Van field will approximate 500,000,000 bbl.

Shortly after the discovery of East Texas field, the attention of operators was called to objectives deeper than the Woodbine. Many fields, productive in either the Paluxy or the Glen Rose or both, such as Talco, Quitman, Manziel, Opelika, Chapel Hill, and others, resulted from this deeper exploratory effort.

1953 developments . . . In order to evaluate best the merits and extent of recent exploratory activity, and better to predict a trend, an anlysis of 1953 activity is presented.

Twenty-nine discoveries were made during the year. Eighteen of these were new-field wildcats, and the remainder

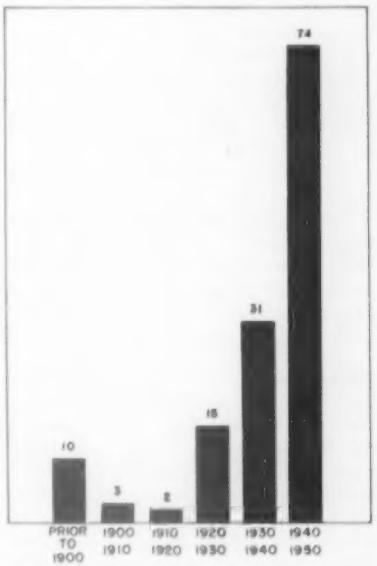


Fig. 4—From a numerical point of view, the last 14 years have been the most prolific in discoveries; however, the new fields have lacked the magnitude of the discoveries prior to 1940.

were vertical extensions. Two of these discoveries are particularly significant and deserve further comment.

Tide Water Associated Oil Co. 1-D Ramey, located in southern Franklin County on the New Hope field anticline, was completed in the Smackover limestone of Jurassic age. Previously established production in this field occurs in four zones in the lower Glen Rose and Travis Peak of the Lower Cretaceous. The 1 Ramey potentialed 42,500,000 cu. ft. of gas per day through perforations at 12,068-12,331 ft. The sulfur content of the gas is approximately 6 tons per million, and the gas-oil ratio is 5,850 to 1. Although this is not the first Smackover producer in East Texas, it was generally considered to be a test case for the Jurassic. Its successful completion will lend impetus to the search for this relatively new objective.

The major discovery of the year was Humble's N. E. Neches Oil Unit No. 1, in northeastern Anderson County, the discovery well of Neches field. Tihis test was completed from perforations at 4,074-4,710 ft. opposite the Woodbine sandstone and flowed at the rate of 139 bbl. of 39°-gravity oil per day through a ¾-in. choke. This discovery was drilled 1 mile off the southeast flank of Boggy Creek field. The discovery is located on an elongate northeast-southwest anticlinal feature which parallels the salt mass. The trap is formed by closure on the structure. The sub-Clarksville, an Eagle Ford sand, is productive over a portion of the structure and adjacent area; this accumulation is primarily stratigraphic. Development of this field is proceeding rapidly. Currently there are more than 75 productive wells on 40-acre spacing. Available data indicate that the recoverable reserves from the primary reservoir, the Woodbine sandstone, will substantially exceed 75,000,000 bbl. It is important to note that this field is not located in an area of sparse control but rather was discovered only 1 mile from production established over a quarter of a century before. A resurgence of drilling on surface features, and a thorough reinvestigation of surface data were initiated by this discovery.

Recent trends . . . Exploratory drilling has been in practically steady ascent for many years. (Fig. 2). The successful search for new fields and deeper pays and new completion techniques which enable profitable extraction from tight reservoirs have continued to widen the vision of local operators. The majority of exploratory tests are Woodbine ventures as is indicated in the statistic that the average depth of wildcat tests is slightly in excess of 5,000 ft. Types of accumulation are extremely diversified. This diversity, in fact, is the keynote to both exploration and production in this area.

The decrease in field completions in the past 5 years can be attributed to the steady decline of development in the major fields, especially East Texas field. This trend will definitely be reversed in 1954 due to the rapid development of recent discoveries.

A generally favorable lease situation exists. Leases bearing 10-year tenure and $1 per acre annual rental are in the great majority. Along the southern and western portions of the area it is possible to acquire moderately well-concentrated blocks at an average bonus cost of $2-$5 per acre. In the fault line, basin, and uplift areas representation is the theme. Bonus costs average $10 to $15 per acre.

All operators, from the small independents through the major companies, can share in the future evaluation and exploration of East Texas. Many areas and objectives of known potential remain relatively untested. The Wilcox trend, a major objective in South Texas, extending across the extreme southern portion of the area remains to be adequately tested. Sizable areas in both the fault line and basin areas will see increased activity with the Woodbine sands the major objective. The great majority of the shallow piercement-type salt domes which lie in the central embayment area are almost completely unexplored. Relatively few wildcats have penetrated and saisfactorily tested the Cotton Valley sands productive to the immediate east in Louisiana. A belt wherein Paleozoic objectives exist at moderate depth lies in the western portion of East Texas.

Both the past and the present enable one to prophesy with reasonable certainty that the East Texas area has a promising future and will continue to bear more than its proportionate share in provisioning the nation's petroleum larder.

Acknowledgments

The writer wishes to thank the management of Shell Oil Co. for permission to publish this paper.

In the treatment of the history of exploratory events during the period 1895 through 1940 the writer has extracted extensively from Dr. C. I. Alexander's excellent paper cited below. Permission to utilize the information is gratefully acknowledged.

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HUGOTON EMBAYMENT

Morrow Discovery Begins Its Tests In Clark County

Sinclair Oil & Gas Co. has begun tests at a gas-distillate strike in Clark County, Southwestern Kansas.

The 1 Combrink, NW SE 22-33s-21w, is testing perforations at 5,350-60 ft. On test at 5,318-35 ft. the gas flow gaged 7,000 M.c.f. per day with volume increasing at end of the test period.

Here is the latest producing area description of Morton County, Kansas' big Greenwood gas field area.

Tri-Pay Discovery Seen For Northern Hutchinson

Permian white dolomite, Pennsylvanian Douglas sand, and Marmaton-Pennsylvanian lime production is indicated at a wildcat in north Hutchinson County, Texas Panhandle.

Phillips Petroleum Co. 1 Ivy "A," Section 48, Block 5-T, T&NO Survey, 10 miles south of Hansford and 1 mile northwest of two-well North Hutchinson-Pennsylvanian field, surfaced gas in 8 minutes at 1,873 M.c.f. per day on test of the Marmaton at 5,923-86 ft.

On test of the white dolomite at 3,462-83 and 3,486-94 ft. the discovery flowed 3,205 M.c.f. of gas per day. Douglas production was indicated at 4,900-67 when 1,683 M.c.f. of gas was reported.

The wildcat is of considerable importance to the Texas Panhandle. Only other Permian production in the entire Hugoton area is in Panhandle and Quinduno fields.

Hansford County . . . This Texas Panhandle county has its second Mississippian gas strike at Humble Oil & Refining Co. 1 Oil Development Co. of Texas, 5 miles north of Spearman in Section 2, Block 4-T, T&NO Survey.

The discovery flowed an estimated 1,500 M.c.f. of gas per day from perforations in the Upper Mississippian at 7,650-76 ft. after acidization and fracturing. The wildcat is 4½ miles northwest of The Texas Co. 1 Blakemore dual Morrow-Penn gas discovery. It is 3 miles northeast of Fulton 1 Matthews Morrow gas strike.

Cherokee strike . . . Sharples Oil Corp. 1 Henderson, 6 miles northeast of Gruve in Section 95, Block 45, H&TC Survey, tested 7,000 to 8,000 M.c.f. of gas per day from Cherokee-Pennsylvanian perforations at 6,252-60 ft. before sulfur water came in.

The wildcat is 2 miles north of Gruver-

Penn field, separated by a Mississippian failure.

Sherman County . . . Phillips has completed a deep Pennsylvanian discovery inside Hugoton field at 1 Kathryn "B," 12 miles east of Coldwater, Tex.

The well completed for 50 bbl. of oil and 40 bbl. of water per day on ½-in. choke from perforations at 5,382-96 ft. in the Missouri lime.

OKLAHOMA

Four Pay Zones Proved At Marshall Prospect

There is a possibility of four pay zones at a Marshall County wildcat, the Bromide, Lake Ardmore, Sycamore, and Viola.

Sinclair Oil & Gas Co. et al 1 Griffin, SE NE NE 16-5s-5e, is below 5,942 ft. Recovery on a test of the Bromide sand at 5,755-75 ft. was 470 ft. of 35.5°-gravity oil and 180 ft. of oil-cut mud. Gas hit the surface in 14 minutes on the 75-minute test at 30 M.c.f. per day. The operators recovered 165 ft. of oil on the Lake Ardmore test at 1,254-72 ft. Effective gas pay was logged at 4,058 to 4,150 ft. in the Sycamore. Gas flow of 340 M.c.f. per day and recovery of 85 ft. of gas-cut mud was tested at 4,836-96 ft. in the Viola lime.

Tests Due At Rank Grady County Wildcat

Testing is due at a rank wildcat south of the Chickasha trend in Grady County, southwestern Oklahoma, several miles from other production.

It is Frankfort Oil Co. and Inland Oil Co. 1 Rifle, SW SE NE 32-3n-7w. Possible commercial production was indicated on a drill-stem test at 2,916-24 ft. The well was drilled to 3,845 ft. Casing is being run to 2,960 ft.

Current Wildcat and Development Work in Grady County Sector of Bradley District

Garvin Sector of Southeast Bradley Pool Developing

Southeast Bradley pool's Garvin County portion is expanding at a fast clip. Phillips Petroleum Co. is completing at a Hart-Springer well in SW NW 7-4n-4w. The firm has set casing in SW SW 7. Magnolia Petroleum Co. is drilling in SE NW 7. They located a new well in NW NW 7. Phillips has a new spot in SW SW 7. Hart sand production extends through 18-4n-4w. Cities Service Oil Co. has a wildcat under way in NE NE 17-4n-4w. West Lindsay pool was opened by Vickers in SE SE 7. Production was from Hart sand.

New Outpost To Bromide Reservoir At Bradley

Gulf Oil Corp. 1 Branch Unit, NE NW 24-5n-5w, Grady County, will test the Ordovician sands ½ mile southwest of the 1 Costello in NE SE 14-5n-5w.

The 1 Costello was completed flowing 78 bbl. of oil per hour from first and second Bromide sands.

Southeast Bradley . . . Two Springer wells have been put on production in Southeast Bradley pool, further evaluating the prolific reservoir.

Magnolia Petroleum Co. 1 Addison-Burkes, C SE NW 13-4n-5w, flowed 261 bbl. of Springer oil from perforations at 9,508-76 ft. in 18 hours on 20/64-in. choke. The 2 Thomas, C NE NE 14-4n-5w, flowed 202 bbl. of oil per day through 20/64-in. choke on perforations at 9,424-96 ft. Both wells were treated.

MICHIGAN

A new Traverse oil discovery well was in prospect for west Michigan this week at the Lowell C. Bernhardt 1 Cutler, NE SW SE 21-17n-17w, Riverton Township wildcat, Mason County.

Wildcat, being considered very favorably as a possible new field opener, is located on a previously recognized anomoly. This good showing of oil in the top of the Traverse, which may prove to be enough for com-

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mercial production, enhances this prospect. The possible new field opener is located about 3½ miles northeast of Pentwater Traverse-Dundee oil pool, Oceana County. If this new area is in any way comparable with the Pentwater district, geologists believe that the most potential Traverse section is yet to be drilled, at a point about 30 ft. in the Traverse. This zone has carried the best oil pay in the Traverse in Pentwater. Likewise, the Dundee is considered as a possible pay horizon.

Interest in the prospect of developing a shallower Traverse oil pool over the older Crystal Dundee field, Montcalm County, was growing this week as Don Karcher continued natural production tests at his 1 Strait, NE SE NW 3-19n-5w, a skid offset to an old Crystal field well which produced and sold about 2,000 bbl. of oil from the Traverse before being deepened to the Dundee some 19 years ago. The Karcher Strait 1, bottomed out in Traverse at 2,771 ft., was being flowed at a restricted rate of 100 bbl. of oil and no water a day from pay at 2,769-71 ft. Well flowed as much as 118 bbl. of oil natural in 12 hours before being pinched back.

CALIFORNIA

Pipe Set in San Fernando Test

A wildcat 2 miles east of Aliso Canyon field, near San Fernando, has indicated it may result in a shallow oil discovery. Drilled to 2,766 ft., C. W. Teater 1 Teater-Wadley encountered a prospective oil sand at 2,530 ft. After setting 7-in. casing at 2,535 ft. the operator then ran a 5-in. liner to 2,765 ft.

Prior to setting pipe a 1¼-hour test of the interval 2,558-2,705 ft. resulted in the recovery of 1,170 ft. of fluid, of which 670 ft. was oily, gassy mud. On a second test at 2,566-2,766 ft., 900 ft. of gassy, oily mud was recovered. Location of the wildcat is in SW NE 25-3n-16w.

Sunset Beach Test Watched

Atlantic Oil Co.'s wildcat approximately ¾-mile southeast of the two-well Sunset Beach field, coastal Orange County, was being given a fair chance of being successful. On a formation test above 5,990 ft. crude and salt water were recovered. By the first of last week Atlantic 1 Ramser had cored to a depth of 6,275 ft. Site of the test is in NW NW 29-5s-11w.

East of the discovery well W. L. Meeker was under way with 1 Lomita Land in NE SW Section 20. Northwest about 2 miles, and in line with the Beverly-Newport trend of fault-line fields, Hancock Oil Co. was preparing location for 1 Alamitos Land in 13-5s-12w.

Helm Discovery Completed

Intex Oil Co. 26-29 Benddom was completed in the Nortonville sand, Eocene age, to open a new pool about 1½ miles southeast of Helm field, Fresno County. The well was yielding approximately 45 bbl. of 33°-gravity crude daily through perforations at 8,298-8,316 ft.

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KANSAS

South Younger Field Opens In Ellis County

Ellis County has a new producing area. It is South Younger field, opened at Transit Corp. and Davis Bros. 1 Lang "T," NE SE NW 8-14s-17w.

Daily potential of the discovery well is 125 bbl. Production is from the Arbuckle. Total depth was 3,553 ft., top of the Arbuckle at 3,546 ft. The new pool is located 1 mile south of Younger field and 4 miles southeast of Hays, Kans.

Pipe Cemented At Barton Prospect

Pabco Drilling Co. has cemented casing to test a wildcat in Barton County. It is the 1 Simmons, SE SE SW 3-18s-11w. A drill-stem test in the Lansing at 3,067-3,107 ft. recovered 129 ft. of heavy oil and gas-cut mud and 124 ft. of free oil.

The wildcat prospect is 1 mile northeast of Ames field and 1½ miles northwest of Roesler field.

Lansing shows are reported at Rocket Drilling Co. 1 McDonald, SE SW NE 34-20s-13w. Recovery was 290 ft. of oil and gas-cut mud and 190 ft. of very heavy oil and gas-cut mud on drill-stem test at 3,250-3,340 ft.

ILLINOIS

In Jasper County Pure Oil Co. 5-A John W. Honey, C SW NE 17-5n-10e, 10 miles north of Olney near West Liberty, found a possible new multiple zone deep pay.

The well flowed natural on a drill-stem test

of the Salem at 3,283-3,336 ft. Also showing commercial possibilities were the Carper sand at 4,145-4,212 ft.; the Devonian lime at 4,325-56 and 4,475-4,518 ft.

First oil production is indicated for Moultrie, County. It is Lloyd Younger, Jr., and Associates 1 Fulk, SW SW NW 10-14n-4e, 7 miles northwest of Sullivan near Bethany. The well is 22 miles from production.

CANADA

Provinces Add Five New Discoveries

Another five wildcats in western Canada were chalked up as discoveries or indicated discoveries of oil or natural gas the past week. Two of the wells, one in the Acme area, the other in the Lougheed area, were in Alberta. Manitoba accounted for two, in the Scarth and Cromer areas of that province, while the remaining one was in the Lampman area of Saskatchewan.

Lougheed . . . The well in the Lougheed area of Alberta, is being drilled by the team of Richfield Oil Corp. of California, Husky Oil & Refining and Phillips Petroleum Co. of Oklahoma. It lies about 45 miles northeast of Stettler and 15 miles southwest of Hardisty.

This venture, Richfield-Hudson's Bay-Husky-Phillips 4-10 Cameron, LSD 4, 10-42-12w4, discovered a small flow of natural gas in the Viking sand and a fairly substantial gas flow in the basal quartz formation.

Acme . . . The other Alberta discovery, in the Acme area, was found in the D2 Devonian zone, at a Canadian Delhi, Banff Oil Co. and Canadian Superior Oil of California venture. The well, Delhi-Banff 2 Acme, LSD 16, 23-29-25w4, is a follow-up to the team's D3 oil strike that was chalked up during July of this year. This venture, while discovering oil in the D2 zone, was later proven as a failure in the first well's discovery horizon as only salt water was recovered on drill-stem test.

Manitoba . . . The Manitoba wildcat in the Scarth area, about 6 miles south of Virden town and Roselea oil wells, discovered oil in the Mississippian limestone. This well is being drilled by Souris Valley Oil Co., Ltd., Williston Basin Oil Exploration Co. and Spooner Oils, Ltd., on a farmout from Canadian Superior Oil of California, Ltd.

Initial drill-stem test in the discovery horizon gave up a substantial recovery of clean oil along with some water-cut oil and salt water frm a 20-ft. interval, and indications are that the new strike may be commercially productive, but production testing will be necessary to evaluate the find.

The venture is Souris Valley-Williston Basin 1-22 Jeffery, LSD 1, 22-9-26w1, and discovery appeared during a 1-hour drill-stem test run from 2,119-2,139 ft.

The other discovery in that province came at a joint British American Oil Co., Ltd., and Union Oil Co. wildcat in the Cromer area, about 12 miles southwest of Virden town and 5 miles south of Daly Mississippian oil field.

This oil encouragement, from the Mississippian limestone, came at the B. A.-Union 15-1 Kool well, LSD 15, 1-9-28w1, which is 2 miles southeast of East Cromer oil pool and 3¼ miles northwest of Woodnorth area oil wells.

Saskatchewan . . . The Saskatchewan wildcat, a Canadian Gulf Oil Co. venture, is being drilled on farmout lands acquired from Canadian Devonian Petroleums, Ltd. It is located in the Lampman area, on the same spread of 51,320 acres of crown lease lands on which the team's Frobisher Mississippian oil wells are located.

The well, Canadian Gulf-Canadian Devonian 5 Walter, LSD 5, 14-5-6w2, is 14½ miles northwest of Frobisher oil field and 20 miles northeast of Estevan. Gulf reported that the Charles formation contact at 4,396 or 2,447 ft. subsea, and the Mission Canyon at 4,504 ft., or 2,555 ft. subsea.

TEXAS

WEST TEXAS

Upton and Terry County Discoveries Are Completed

Midwest Oil Corp. and White Eagle Oil Co. 1 Guetersloh, located in southeastern Terry County, and just north of San Andres production in Adair field, has been completed for a daily potential of 364.7 bbl. Gravity was 42.5° and gas-oil ratio was 748:1. Pay was a reef section topped by samples at 8,844 ft. on elevation of 3,230 ft., and perforated at 8,846-64 ft. Potential test was through 14/64-in. choke and flowing tubing pressure registered 450 psi.

In northwestern Terry County a new pay, lower Clear Fork, was in prospect for Prentice field. This field has had intensive development drilling throughout the past year, and produces from the Clear Fork at 6,700 ft.

The new prospect is Honolulu Oil Corp. 19 Ellington "B," Section 19, Block K, PSL Survey, 6 miles north of Tokio. Projected depth of the wildcat is 12,500 ft. to test the Devonian.

Honolulu's test has reported good oil shows on three drill-stem tests in the lower Clear Fork. A 4-hour test at 7,873-7,903 ft. recovered gas in the drill pipe, plus 3 ft. of oil and 280 ft. of heavily oil and gas-cut mud. A 6-hour test at 7,903-33 ft. flowed gas in 1 hour and 40 minutes and recovered 1,000 ft. of free oil.

Upton County discovery . . . Humble Oil & Refining Co. 1 Henry M. Halff estate, an outpost test southeast of Strawn and Ellenburger production in Amacker-Tippett field, was completed for 408 bbl. of oil a day from the Wolfcamp. Potential was based on a 16-hour flow of 272.32 bbl. of 42.8° oil, through 19/64-in. choke, from perforations at 8,967-82 and 8,992-9,018 ft. Gas-oil ratio was 930:1 and tubing pressure was 300 psi.

Tentative top on the Wolfcamp was 8,230 ft., or minus 5,534 ft. Other wells in the Amacker-Tippett field have flowed Wolfcamp oil but none has been completed in that pay.

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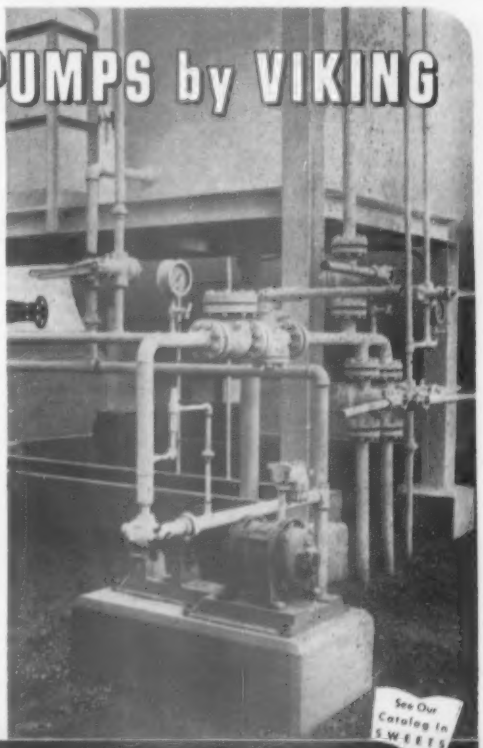

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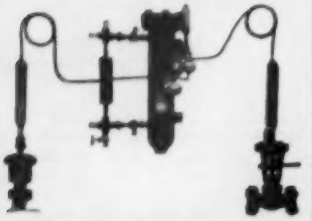

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WICHITA FALLS, TEXAS

Midland County . . . Gulf Oil Corp. 1-L Scharbauer, multi-pay prospect in extreme northern Midland County, has run two tests in the Ellenburger and was preparing to core ahead.

Top of the Ellenburger was 12,714 ft. The well's initial test of the formation, at 12,713-12,763 ft. flowed oil in approximately 6 hours, and when turned into tanks, made 34.50 bbl. of 45° oil in 6 hours, with no water. A 1-hour test at 12,821-12,856 ft. returned 15 ft. of mud, with no shows reported, and operators prepared to core. This well has indicated production in the Pennsylvanian and in the Simpson. Nearest Ellenburger production is in Headlee field, 17 miles southwest.

Ward County . . . British American Oil Producing Co. 1 Tubb, which has already found 3 prospective pay zones in the Glorieta, Fusselman and Waddell, has recovered some shows in the Ellenburger.

The Ellenburger test, at 8,048-96 ft., was open 2 hours. The well flowed gas but recovered a small amount of gas and oil-cut mud.

Meanwhile, Trebol Oil Co. and E. G. Rodman, Odessa, have staked location for an Ellenburger wildcat about ¾-mile southwest of British American 1 Tubb. The new location is in Section 17, Block 20-B, PSL Survey, and will also be 1 J. B. Tubb.

NORTH TEXAS

High Potential Filed on Wichita County Discovery

W. H. Hammon 2 Rathberger, Block 14, K&N Subdivision of the Cherokee County School Lands Survey, 6 miles south of Wichita Falls, has been completed as a Vogtsberger sand discovery.

On potential test the well flowed 750 bbl. of 41° oil a day through 11/64-in. choke, from open hole at 4,842-50 ft. Gas-oil ratio was 400:1.

Wise County . . . Tom B. Medders 1-B Boykin, east offset to the discovery of Sancree-Strawn pool, 5 miles northwest of Alvord, recovered 130 ft. of oil and 10 ft. of oil-cut mud on a drill-stem test in the Strawn at 4,611-17 ft.

Christie, Mitchell & Mitchell have slated another wildcat for Wise County, ½ mile north of Paradise. The proposed operation is 1 L. W. Clark, located in the Andrew Robinson Survey, A-706, and projected to 6,000 ft.

TEXAS GULF COAST

Magnolia Discovery Opens New Production at Tamina

Magnolia Petroleum Co. has completed a new oil-discovery well in the Tamina area, 7½ miles southwest of Conroe, in South Central Montgomery County.

The well, its 1 Ina Arcenaux (A on map), flowed 113.7 bbl. of 36.9°-gravity oil in 24 hours through 9/64-in. choke on potential gage. Flow was with gas-oil ratio of 1,055 cu. ft. per barrel, and pressure of 575 psi.

Location is approximately 1½ miles northeast of a small, pumping discovery-well, 1 Chase (B on map), completed by the same company last March.

Both wells produce from the same sand, the 1 Arcenaux from casing-perforated interval at 9,172-75 ft., and the Chase well at 9,188-96 ft. Production of the latter was at the rate of 58 bbl. per day with 3 per cent water.

The area is approximately 2½ miles southeast of Lake Creek field, nearest production. Tentative name is "Arcenaux."

Second Lou Hill Producer Opens Deeper Pay Horizon

Caribbean Oil Corp. has completed its second well in the new Lou Hill area, 6 miles southeast of Louise, in western Wharton County, extending production 2,700 ft. east, and opening a deeper pay, more than 300 ft. below that of the discovery well.

Testing perforated interval in Frio sand at 5,792½-94½ ft., the well, 1 Hancher, flowed 120 bbl. of 33.4°-gravity oil per day through 8/64-in. choke with gas-oil ratio of 456 cu. ft. per barrel, and pressure of 775 psi.

The company's discovery well, 1 Stovall, completed last August, flowed at the rate of 92.5 bbl. of 27.8°-gravity oil per day through 8/64-in. choke with pay interval, also in Frio sand, at 5,454-56 ft.

The area is about 1 mile east of the south tip of Louise field.

SOUTHWEST TEXAS

New Gas-Condensate Area Indicated Near Clarkwood

Discovery of a new gas-condensate area in Nueces County is indicated by showings encountered in a wildcat test being drilled by F. P. Zoch, Jr., about 2 miles south of Clarkwood, west of Corpus Christi. The test, 1 Bevly, drilled to 7,514 ft., has at least two prospective producing zones, the first at 7,152-73 ft., and the other . . 7,408-18 ft.

In a 12-minute drill-stem test of the shallower zone, maximum working pressure through ¼-in. chokes was 800 psi., bottom-hole flowing pressure 3,095 psi., and shut-in pressure 3,155 psi. Break-down recovery was 5 gal. of distillate and 100-ft. of distillate-cut mud.

A 10½-minute test in the deeper pay had working pressure of 750 psi., bottom-hole flowing pressure of 3,285 psi., and shut-in pressure of 3,320 psi. Recovery was 45 ft. of distillate-cut mud with 2 gal. of clear distillate.

KENTUCKY

EASTERN KENTUCKY

In Leslie County and located on Sugar Creek, United Fuel Gas Co. has completed its wildcat test 6 Fordson Coal Co. for a gas producer from Corniferous lime topped at 2,445 and penetrated to a total depth of 2,575 ft. Well gaged, after shot, 315,000 cu. ft. of gas daily with a rock pressure of 352 pounds.

In Lawrence County on Blaine Creek, Columbian Fuel Corp. has completed 1 William Adkins for 5 bbl. of oil daily from the

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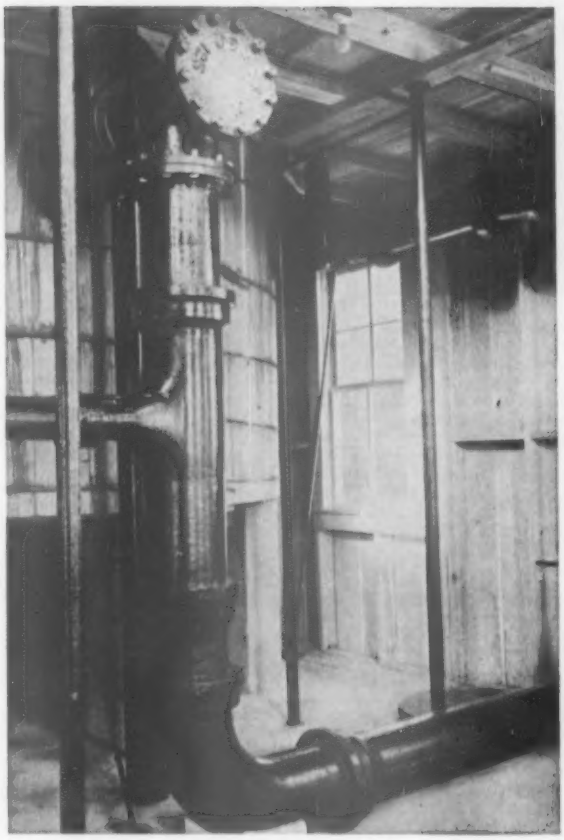

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LOUISIANA

NORTH LOUISIANA

Bienville Gets New Oil Strike

Pure Oil Co. has completed its 1 J. B. Smith, a wildcat well in Bienville Parish, Louisiana, after a 5-hour test which produced at the rate of 330 bbl. per day through 20/64-in. choke.

The well is in the Bryceland prospect, 5 miles southwest of Bryceland, and approximately 50 miles east of Shreveport. The nearest oil production is 9 miles to the west, and the closest gas field is 4 miles to the southeast. Pure Oil's acreage holdings in the area total approximately 4,700 acres.

Production is from the Pettit limestone at a depth of 7,022 to 7,080 ft., and the gravity of the crude is 36.7° at 60° F. Additional drilling locations are scheduled for the area.

SOUTH LOUISIANA

Extension Test at Scott Completed as Producer

Production in the new Scott field, 6 miles west of Lafayette, in Lafayette Parish, is being extended 1,800 ft. to the southwest by the field's third oil-producer being completed by F. A. Callery and associates.

The well, 1 Edwin Foreman, perforated at 10,553-57 ft. in the Frio-Richard sand, productive zone of the other two wells, flowed at the rate of 232 bbl. of oil per day in a 60-minute test through 8/64-in. choke. Later flow on an 8-hour gage through 7/64-in. choke was at the rate of 80 bbl. per day. Gas-oil ratio during the latter gage was 4,030 cu. ft. per barrel.

Discovery well, drilled by Bates & Cornell, of Lafayette, was completed last February. Its west offset, drilled by the same operators and F. A. Callery, Inc., of Houston, confirmed the discovery in July, after the east offset, drilled by Pan American Production Co., failed to get commercial production.

Duson area . . . Five miles to the southwest in the recently revived Duson field, Lafayette Parish's only other production, Sunray Oil Corp. and Buffalo Oil Co. are completing their second well, 3 McConnell, opening a new pay zone, more than 1,000 ft. below their discovery well's producing level.

Their new well, 1,800 ft. southwest of the discovery well, flowed at the rate of 51 bbl. of 45.3°-gravity condensate and 2,770,000 cu. ft. of gas per day on tests through 10/64-in. choke. Flowing pressure gaged 7,600 psi. Pay interval is 11,058-86 ft. Pay interval of the first well, completed last April, is at 9,940-50 ft.

Thornwell Area Spreads

Extension of the Thornwell gas-distillate area of southern Jefferson Davis Parish more than a mile southwestward into northern Cameron Parish has been established by Pan American Production Co. and Austral Oil Exploration Co., Inc.

Their extension well, 1 Lacassine, testing Miocene sand at 9,632-48 ft., flowed at the rate of 3,700,000 cu. ft. of gas and 50 bbl. of condensate per day through ¼-in. choke with 2,500-psi. pressure. Hole is plugged back from a total depth of 15,043 ft. after getting no shows in the lower zones.

ROCKY MOUNTAIN

COLORADO

Logan, Morgan, Adams Discoveries Tested

Apparent discoveries in three Colorado counties within the Denver Julesburg basin have been reported during the past week.

S. D. Johnson and Cosden Petroleum Co. recovered 240 ft. of oil and 60 ft. of heavily oil and gas-cut mud on test of 1 Rosener, SE SE SW 12-1s-59w, Adams County. Test was of "D" sand at 6,120-39 ft. Tool was open for 2 hours. A substantial section of "D" sand, well saturated and with vertical fractures was cored. The operators reported the sand relatively hard and tight, but with vertical fractures. The sand in this well was cored without success, and completion will be in "D" sand.

In Morgan County Sanford Production Co. is completing 1 Atkinson, SW SW SW 10-2n-55w as a "D" sand gas discovery. The well made gas at the rate of 4,200,000 cu. ft. per day on test of this formation 4,952-88 ft. Test of "J" sand recovered water. The well is 4½ miles north of gas production in Stony Point field.

In Logan County, Frontier Refining Co. recovered 5,533 ft. of gassy oil on 1-hour test 5,526-33 ft. at 1 Frasco-2, C NE NW 4-7n-55w. Flowing pressure was 790-1,350 psi. The test was in "J" sand. The operator has set casing and is preparing to test. The wildcat is 2 miles northwest of production at Pawnee Hills.

Rio Blanco County Discovery Reported

Equity Oil Co. is unofficially reported to have recovered a flow of gas at 4,000 to 5,000 M.c.f. per day rate from 1 Clubine, C NE NE 18-3s-95w, Rio Blanco County. Test was of the Green River, with total depth 2,689 ft. Other details were not reported. The operator is moving in cable tools apparently for a completion in the tested zone, although the well was originally scheduled as a 3,500-ft. Wasatch test.

NEVADA

New Wildcat Announced For Nye County

Bandini Petroleum Co. is rigging up for a 7,000-ft. Palezoic test at 1 Government-Harris, C SW NE 25-10n-57e, in the Railroad Valley area, Nye County. The well is the first wildcat in the area outside Shell Oil Co.'s Eagle Springs Unit.

WESTERN NEBRASKA

Kimball Area Discovery Tested

Williamson, Nixon and United Drilling Co. recovered 1,600 ft. of oil with 200 ft. of water on drill-stem test of Dakota at 6,300½-45 ft. at 3 Swearingen, NW NW NW 10-14n-55w, Kimball County, and are now preparing to complete. Tool was open 1 hour and flowing pressure on the test was 55-575 psi.

The well is in the trend southeast of the city of Kimball where recent exploration has opened the Hafemand and Lodgepole pools, in addition to Swearingen pool, also discovered by Williamson et al. The present well is 1 mile northeast of the previous discovery by these operators. The previous discovery was offset by production to the southeast, but drilling on the northwest was unsuccessful.

MONTANA

New Williston Basin Exploration Scheduled

Zach Brooks made location for an 8,500-ft. Winnipeg test at 1 State, C SE SE 18-36n-44e, Daniels County. The well is west of previous exploration in the county. In Roosevelt County, Deep Rock Oil Corp. has location for 1 LePage, C NW SW 14-28n-49e, a scheduled test of Mission Canyon at about 9,500 ft. Amerada Petroleum made location for a wildcat at 1 Rock Creek Unit, SE SE SW 10-22n-44e, McCone County.

Phillips County Wildcats Staked

Carter Oil Co. has made location for a 5,200 ft. Devonian test at 1 Tuma, C NW NE 25-31n-28e, in the Wagner area, Phillips County. The wildcat is 20 miles west of gas production in Bowdoin field, and in an area which has no previous drilling.

South of Bowdoin Dekalb, Northern Oil Division has made location for 1 Gjersing, C SE NW 12-29n-31e, scheduled to test Madison.

NORTH DAKOTA

Williams County Discovery Completed

Western Nodana and Paul Rutledge have reported a flow of 425 bbl. of oil per day at completion of 1 Westberg, NW NW 31-159n-95w, Williams County. The well is 1 mile north of previous production. Gage was through 11/64-in. choke.

Stark County Wildcat Abandoned

Sun Oil Co. has temporarily abandoned 1 Beaudonin, NW SW 9-138n-99w, Stark County. The operator recovered 140 ft. of free oil and considerable quantities of oil and gas-cut water on drill-stem test. On swab test of the zone 9,170-90 ft. recovery had more oil than water. Total depth is 9,656 ft. and only minor shows were reported in lower zones.

APPALACHIAN AREA

WEST VIRGINIA

Three wildcat completions were reported on the Hiram Anticline, Randolph County, West Virginia. In Middle Fork district, Nollem Oil & Gas Corp. 3 Moore Keppel & Co., Inc., tested 2,675,000 cu. ft. gas, fifth sand, TD 1,696 ft. In Roaring Creek district, this operator completed Goff-Arnold Land Co., gaging 2,250,000 cu. ft. gas in the same formation, TD 2,266 ft. Edwin J. Fitzgerald 1 M. D. A. Cunningham, elevation 2,245 ft., was light, resulting in 95,000 cu. ft. gas, Benson sand, TD 3,879 ft.

OHIO

Gnadenhutten pool was further extended to the southeast with a nice well on 1 James Garabrandt, Lot 11, Clay Township, Tuscarawas County. The gasser, completed by Blacksten et al topped the Berea at 1,049 ft. and finished, still in sand, at 1,109 ft. with 4,000,000 cu. ft. natural.

Ohio Fuel Co. 1 Henry Sofas, Lot 6, Hinck-

ley Township, Medina County, was successfully plugged back to the upper Newburg and acidized. The volume is increasing and will probably shut-in at 450,000 cu. ft.

A south extension to Parma gas field was completed by the Rock Ridge Co. on 1 Kammas Corners Realty Co., Section 12, Royalton Township, Cuyahoga County. Clinton sand at 3,419-3,442 ft. gaged 330,000 cu. ft. natural with 1,000 lb. pressure.

Great Lakes Carbon Corp.'s deep test on Goldie Scott, Section 20, Liberty Township, Washington County, was reported as having no production in the Oriskany horizon at 5,090-5,132 and 5,141-5,147 ft., and plans are being made to deepen to the Medina or Queenston shale.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Bexar County: Jack Wilson 1 Hartl, Jose de la Garza Sur., A-769. Dry. TD 2,506 ft.

Dimmit County: Adams & Haggerty 1 Vesper, B. Vesper Sur. 30, A-1042. Dry. TD 5,203 ft.

Frio County: Howeth & Mason 1 Peters et al, John Seibel Sur. 203, A-619. Dry. TD 4,312 ft.

Glen A. Martin and James M. Anderson 1 Marrs McLean, Sec. 9½, B. O. Stout Sur., A-1172. Dry. TD 5,800 ft.

Theljohn Oil Co. 1 Davidson, Samuel Brown Sur., A-988. IPP 36.45 BOPD, 42°, perforations 2,402½-05½ ft. TD 2,429 ft. (New field—Sleepy Creek.)

Wilson County: Morris Cannan and Robert D. Mebane 3-A Ploch, Claiborne Rector Sur., A-134. Dry. TD 3,424 ft.

District 4

Duval County: Bridwell Oil Co. 1-C Nueces Land & Livestock Co., William Speed Sur. 114, A-1886. Dry. TD 3,544 ft.

Kirkwood & Co. 1 Serna, BS&F Sur. 523, A-134. Dry. TD 7,514 ft.

Jim Wells County: Sam Cunningham et al 1 Gower, Sec. 61, R. P. Haldeman Subd. Dry. TD 6,140 ft.

H. R. Smith and George H. Coates 2 Floyd, Block 20, Magnolia Fig & Orange Colony Subd. Dry. TD 6,450 ft.

Nueces County: Carrl Oil Co. and Shore Exploration Co. 1 Giestman, Cuadrilla Irrigation Sur. 137, A-579. Dry. TD 6,014 ft.

Zapata County: T. R. Cunningham 2 Juana Uribe, Survey 249. Dry. TD 3,566 ft.

TEXAS GULF COAST

District 2

DeWitt County: Kirkwood & Co. et al 1 Atkinson, Refugio Amador Sur., A-1. Dry. TD 9,015 ft.

Lavaca County: Republic Natural Gas Co. 1 Cranz, Eusebio Farias Sur., A-170. Dry. TD 9,115 ft.

Live Oak County: H. C. Rix 1 Marston et al, John Turner Sur., A-38. Dry. TD 1,507 ft.

Victoria County: La Gorce Oil Co. 1-A Musselman, IRR Sur. 60, A-431. Dry. TD 4,520 ft.

District 3

Chambers County: John W. Mecom 1 Barrow et al, C. Ramon Sur., A-362. Dry. TD 9,797 ft.

Hardin County: H. J. Chavanne, trustee, and Prince Drilling Co. 1 Keith, W. W. Dies Sur. 2, A-766 (Arriola area). Dry. TD 9,828 ft.

Michel T. Halbouty and George W. Graham 1 Teel estate, T. C. Gaines Sur., A-23. Dry. TD 8,957 ft.

Lenoir M. Josey, Inc., and Brazos Oil & Gas Co. 1 Tortoris et al, P. Miller Sur., A-383. Dry. TD 8,214 ft.

Harris County: J. P. Owen et al 1 Turner, P. J. Menard Sur., A-592. Dry. TD 7,799 ft.

Liberty County: Claud B. Hamill 2 Gulf fee, M. G. White Sur., A-117. IP 60 BOPD, 9/64-in., 24.6°, Frio 3,526-40 ft. (perforations). TD 3,851 ft.

Orange County: Tennessee Production Co. 1 Miller-Vidor, Lot 97, Block 2, Miller-Vidor Townsite Subd., T. H. Breece Sur., A-3. Dry. TD 8,785 ft.

Wharton County: Smith & Smith 1-B Thompson, Block 5, John Crownover Sur., A-17 (Magnet-Withers area). Dry. TD 4,638 ft.

EAST TEXAS

Cherokee County: T. D. Shaw Trustee 2 Bailey, Leander Rhodes Sur. A-724. Dry. TD 4,070 ft. Elev. 347 ft., Woodbine 4,051 ft.

Hopkins County: E. B. Germany & Sons 1 Woodson, Helen Nelson Sur., A-701. Dry. TD 5,497 ft. Elev. 520 ft., Woodbine 4,632 ft.

Kaufman County: Thos. D. Humphrey & Sons 1 Legg, T. Devore Sur. Dry. TD 4,110 ft.

Morris County: Pan American Production Co. 1 Pewitt, G. W. Dyer Sur., A-80. Dry. TD 4,961 ft. Elev. 314 ft., Paluxy 4,665 ft.

Smith County: Sinclair Oil & Gas Co. 1 Thompson, J. M. Procella Sur., A-43, 2½ mi. W East Texas field. IPP 133 BOPD, 42°, GOR 514, Rodessa perforations 7,254-66 ft. TD 8,485 ft.

TEXAS PANHANDLE

Dallam County: Humble Oil & Refining Co. 1 Sheldon, 50-16, H&TC. IP 8,500 M.c.f.

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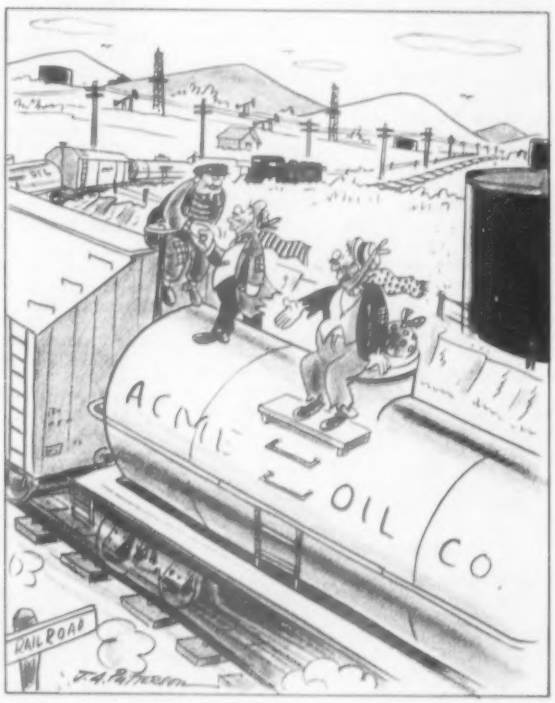

THE OIL AND GAS JOURNAL

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WILDCAT COMPLETIONS

of gas per day, Cisco 3,564-3,624 ft. TD 6,214 ft. (Gas discovery).

Humble 1 Belo et al, 1-1, I&GN. Dry. TD 6,823 ft.

Hansford County: Sinclair Oil & Gas Co. 1 Steel "B," 45-50, H&TC. Dry. TD 6,749 ft.

Sherman County: Phillips Petroleum Co. 1 Katheryn "B," IPF 50 BOPD, 5,382-96 ft., 37.9°, ½-in. TCK. TD 7,277 ft. (Oil discovery).

WEST CENTRAL TEXAS

Callahan County: The Chicago Corp. 1 Griffin, Sec. 82, BBB&C Sur. Dry. TD 3,846 ft.

Stroube Central Co. 1 Williams Estate, Sec. 61, BOA Sur. Dry. TD 3,005 ft.

Warren-Fields-Monroe 1 Scott, P. T. Irrigation Sur. 206. Dry. TD 1,933 ft.

Ted Weiner 1-A Campbell, 11-8-SPRR, 2 mi. NE Eula. IP 209 BOPD, 16/64-in., 33.6°, GOR 1,186, TP 475 psi., perforated Cook sand 1,821-22 ft. TD 1,878 ft.

Coleman County: Anzac Oil Corp. 51-J Morris, Brooks & Burleson Sur. 757. Dry. TD 2,770 ft.

Birdwell & Son Drilling Co. 2-A Simpson, Blk. 12, Samuel Crooks Sur. Dry. TD 2,536 ft.

Haskell County: Union Oil Co. of California 1 Fletcher, 7-14-H&TC. Dry. TD 5,925 ft.

Jones County: J. P. Bryan 1 McLaughlin, Sec. 1, D&DA Sur. Dry. TD 2,810 ft.

Fox & Ransdell 1 Gray, J. W. McKissick Sur. 204. Dry. TD 2,500 ft.

G. E. Hall 1 Touchstone, 31-2-SPRR. Dry. TD 3,472 ft.

Henson Drilling Co. 1 Jackson, M. Fragosa Sur. 267. Dry. TD 5,398 ft.

Thos. D. Humphrey & Sons 1 Taylor, 20-4-H&TC. Dry. TD 5,026 ft.

J. C. Hunter Jr. 1-B Sayles, Robt. Smith Sur. 192. Dry. TD 5,485 ft. Ellenburger 5,053 ft.

Sojourner Drilling Co. 2 Harrison, 49-1 BBB&C. Dry. TD 3,071 ft.

Palo Pinto County: Jack T. Perkins 1-A Long, S. Townsend Sur., A-429. Dry. TD 617 ft.

I. O. Shaw 2 McClure, Sec. 1728, TE&L Sur. Dry. TD 1,383 ft.

Shackelford County: P. S. Kendrick 1-G Hendrick, Sec. 1, Blk. A, AB&M Sur. Dry. TD 1,865 ft.

J. K. Wadley and Bolin Oil Co. 1 Dillar Bros., Sec. 43, LAL Sur. Dry. TD 4,044 ft.

McMahon Bullington Drilling Co. 4-S Corbett, Ruthy Cambell Sur., A-37. Dry. TD 3,300 ft.

Taylor County: King & Herring 1 Knaus, Sec. 3, T&NO Sur. Dry. TD 5,516 ft.

H. L. Neeb 1 Sayles, J. M. Sowell Sur. Dry. TD 3,495 ft.

Twin Oil Corp. 1 Davis, Subd. 1, Grimes CSL Sur. 124. Dry. TD 3,176 ft.

West Central Drilling Co. 1 Sayles, 11-3-SPRR Dry. TD 2,760 ft.

NORTH TEXAS

Archer County: E. B. Clark Drilling Co. 1 Frey, Blk. 17, Palo Pinto, A-339. Dry. TD 4,515 ft.

Double L Drilling Co. 4-B Petrex, Sec. 103, ATNCL Subd., 6 mi. SE Mankins. IPP 121 BOPD, 40°, pay 1,352 ft. TD 1,382 ft.

Double L Drilling 3 Wolf, 31-4-Clark & Plumb. Dry. TD 1,096 ft.

Baylor County: Burt Oil Co. 1 W. T. Waggoner estate, Sec. 74, T&NO Sur. Dry. TD 2,491 ft.

West Central Drilling Co. 1 Hobert, Sec. 2, HT&B Sur. Dry. TD 3,050 ft.

Clay County: J. D. Ramsey 1 Hamilton, Blk. 83, Byers Subd., 4 mi. W Petrolia. IPP 5 BOPD, 35°, pay 254 ft. TD 260 ft.

Triad Drilling Co. 1 Nutter, Blk. 31, WCRR Sur. Dry. TD 4,810 ft.

Cooke County: Kay Kimbell 1-A Buckeley heirs, W. Holmes Sur., A-1058. Dry. TD 6,495 ft.

Jack County: Ada Oil Co. 1 Miller, G. W. Ware Sur., A-2412. Dry. TD 3,482 ft.

Biggerstaff & Gordon 1 Martin, C. C. Cooper Sur., A-1827. Dry. TD 400 ft.

Drill Well Oil Co. 1 King, TE&L Sur. 3310, A-733, 3 mi. NE Jermyn. IP 189 BOPD, 18/64-in., 41°, TP 126 psi., GOR 200, Strawn 3,368-73 ft. TD 3,373 ft.

Wilbarger County: Thomas C. Canan 1-C Waggoner, 1-5-H&TC. Dry. TD 2,004 ft.

J. O. Hancock 1-E Waggoner, Sec. 1, SPRR Sur. Dry. TD 2,004 ft.

Frank Wood Associates 1 Waggoner "Lee," 21-4-H&TC. Dry. TD 2,005 ft.

Young County: J. R. Dougherty and D. T. Dougherty 1 Millis, J. H. Woods Sur., A-2183, Blk. 122. Dry. TD 4,405 ft.

Smithsonian Oil Co. 1 King, TE&L Sur. 460, A-667. Dry. TD 558 ft.

Westheimer & Neustadt 1 Larimore, TE&L Sur. 2247. Dry. TD 4,040 ft.

WEST TEXAS

Andrews County: Humble Oil & Refining Co. 1 Bristol, 5-A37-PSL, 22 mi. NW Andrews. IPP 27.85 BOPD, 35°, GOR 263, Wichita Albany pay 7,470 ft. TD 8,606 ft.

Borden County: The Hanley Co. 1 Higginbotham, 9-31-T3N-T&P. Dry. TD 8,113 ft. Elev. 2,357 ft., reef 7,793 ft.

Crockett County: Southern Union Gas Co. 1 Shannon, 26-GG-HE&WT. Dry. TD 2,062 ft.

Glasscock County: Hunt Oil Co. 1 Houston, 23-35-T2S-T&P. Dry. TD 3,695 ft.

Pecos County: Intex Oil Co. 1-62 Girvin, 62-11-H&GN. Dry. TD 3,650 ft.

Neville G. Penrose, Inc. 1 Bennett, 8-119-GC&SF. Dry. TD 4,260 ft.

Tom Green County: Delaware Drillers, Inc. 1 Jones, German Emigration Sur. 809. Dry. TD 5,920 ft.

Fortune Drilling Corp. 1 CSL, Lot 5, Llano CSL Sur. 964. Dry. TD 6,295 ft.

Upton County: Porter Rankin 1 Neal, 26-B-HE&WT. Dry. TD 3,974 ft.

WEST TEXAS BORDER COUNTIES

Runnels County: Creslenn Oil Co. 1 Bright, Sec. 37, Cuadrilla Irrigation Sur. Dry. TD 4,211 ft.

Thos. D. Humphrey & Sons 1 Barrett, Blk. 4, A-19, Burnett CSL. TD 4,605 ft.

Ted Weiner 1 City of Winters, T. R. Webb Sur. 358, 5 mi. E Winters. Dry. TD 4,395 ft.

Stonewall County: Southern Minerals Corp. 1 Seabury, Sec. 23, Blk. A, Arnold & Bennett Sur. IPP 115 BOPD, 40°, GOR 400, pay 5,224-44 ft. TD 6,594 ft.

NORTHERN NEW MEXICO

Rio Arriba County, South Dulce: Continental Oil Co. 2 South Dulce, SE SW SW 16-28n-2w. Dry. TD 6,076 ft. Point Lookout.

Southern Union Gas Co. 1 "F" Jicarilla, SE NW SW 27-26n-4w. IP 422 M.c.f. of gas per day, Cliffhouse discovery, new field. TD 6,083 ft.

SOUTHEAST NEW MEXICO

Eddy County: J. W. Baker 1 Rayroux, 24-21s-26e. Dry. TD 3,206 ft. Elev. 3,190 ft., Delaware sand 2,512 ft.

Lea County: Stanolind Oil & Gas Co. 1 Buffalo-Unit, 3-19s-33e, deep pay discovery in southern Artesia field. IPP 136 BOPD, Wolfcamp perforations 10,597-10,620 ft. TD 14,916 ft.

Superior Oil Co. 1-23 McAlpin, 13-18s-35e, 17 mi. W. Hobbs. IP 182 BOPD, 24/64-in., TPP 90-20 psi., GOR 760, 42°, Leonard perforations 9,980-93 ft. TD 12,355 ft.

ILLINOIS

Calhoun County: Redman & Burnett 1 Fienop, NE SW SE 6-8s-4w. Dry. TD 1,230 ft.

Clark County: F. R. Stocker 1 Downey, NE SE NE 9-9n-13w. Dry. TD 822 ft.

Clinton County: M. Mazzarino et al 1 Bolker, SW SE NE 12-1n-2w. Dry. TD 1,371 ft.

P. Andrews 1 Reinkensmeyer, SE NE SE 32-2n-1w. Dry. TD 1,476 ft.

Coles County: C. M. Faulkner 1 Crawford, NE SE NE 17-14n-14w. Dry. TD 480 ft.

Jefferson County: C. E. Brehm 1 Cowger, SE NE NW 11-3s-3e. Dry. TD 2,944 ft.

Kankakee County: R. B. Kintop 1 Witheft, SE SE SE 23-30n-9e. Dry. TD 485 ft.

Lawrence County: V. R. Gallagher 1 Easterday, SW SW SW 21-2n-12w. Dry. TD 2,056 ft.

W. H. Krohn 1 Steffey Est. "A," NW SE SW 33-5n-11w. Dry. TD 1,748 ft.

Lee County: J. Stelle Associates 1 Child, SE SE SE 14-19n-9e. Dry. TD 442 ft.

Livingston County: Dickinson Oil Co. 1 Larson, NW NW SW 4-29n-5e. IP 210 M.c.f. of gas per day, Penn. sand 304-385 ft. (Discovery "Pontiac gas). TD 620 ft.

Macon County: M. H. Richardson 1 Wilson, NW NE SW 11-18n-3e. Dry. TD 2,070 ft.

Marion County: H. F. Robison et al 1 Erwin heirs, NW NW SE 30-4n-2e. Dry. TD 1,732 ft.

Massac County: W. T. Edmison et al 1 Foss, SE SE SE 1-14s-4e. Dry. TD 869 ft.

Montgomery County: L. L. Benoist Trusts 1 Taylor, NW SE SE 14-7n-4w. Dry. TD 2,705 ft.

Morgan County: C. C. Pearson 1 Cromwell, NE SE SW 12-15n-10w. Dry. TD 380 ft.

Randolph County: E. L. Dittmeier 1 Lyons, NE SE SW 6-4s-6w. Dry. TD 550 ft.

Saline County: Calvert Drilling Co. 1 Endicott, NW SW SE 2-8s-7e. IPP 65 BOPD, Waltersburg 2,117-22 ft. TD 3,050 ft. (Discovery North El Dorado pool).

Sangamon County: E. P. Gallagher 1 Darnall, NE NW NW 4-15n-3w. Dry. TD 1,787 ft.

Tazewell County: P. H. Martin 2 Zuercher, NE NW SE 29-26n-3w. Dry. TD 1,825 ft.

Washington County: J. L. Lester 1 Ciglenski, SE SE NE 34-2s-1w. Dry. TD 1,800 ft.

Jet Oil Co. 3 Hunleth, NW SW NW 33-3s-4w. Dry. TD 1,362 ft.

White County: Vanderbach & McGuire 1 Jordan, SW SW NE 16-6s-8e. Dry. TD 3,315 ft.

INDIANA

Daviess County: Lohman & Johnson 1 Pershing, SW SW SW 28-5n-5w. Dry. TD 995 ft.

Dubois County: Wheeler Drilling Co. 1 Bonifer, SW SW NW 27-1s-6w. Dry. TD 1,409 ft.

Spencer County: Mullenax 1 Kron, SE SE SE 11-5s-6w. IPP 12 BOPD, Cypress 1,009-16 ft. TD 1,016 ft. (Discovery of South Gentryville).

WESTERN KENTUCKY

Davies County: R. Hal Compton 1(2) Nicely, SW NE SE 13-O-30. Dry. TD 1,037 ft.

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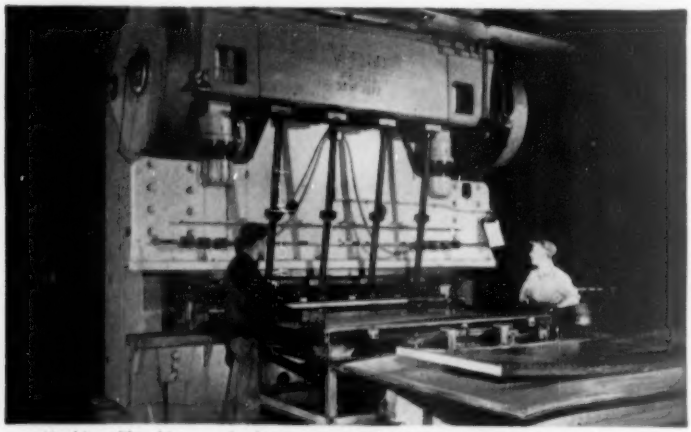

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WILDCAT COMPLETIONS

Stevens Drilling Co. 1 Oliver, NE NW NE 11-Q-31. Dry. TD 1,285 ft.

Muhlenberg County: Adams Petroleum Co. 1(2) McKinney, NE SW NW 15-H-300. Dry. TD 1,380 ft.

MICHIGAN

Benzie County: R. W. Devine and J. W. Lang Co. 1 Bye, SW SE SE 13-25n-13w. Dry. TD 1,526 ft. in Traverse lime.

Cass County: T. C. Carter, Trustee 1 White, NE NE NE 12-7s-14w. Dry. TD 960 ft. in Traverse lime.

Livingston County: McClure Oil Co. and Thomas Mask 1 Jonckhere, SE NW NE 36-3n-3e. Dry. TD 5,763 ft. in Trenton

Mason County: Robert Bond 1 Lerch, et al, SW SE NW 10-17n-15w. Dry. TD 2,000 ft. in Traverse lime.

Newaygo County: Fisher-McCall Oil & Gas, Inc. 1 Anderson, NW SW SW 13-12n-14w. Dry. TD 2,239 ft. in Traverse lime.

WEST VIRGINIA

Randolph County, Middle Fork district: Nollem Oil & Gas Corp. 3 Moore Keppel & Co., Inc., elev. 2,214 ft., 2,675,000 cu. ft. gas after Sandfracing. Fifth sand 1,682 ft., gas 1,682-1,693 ft. TD 1,696 ft.

Roaring Creek district: Nollem Oil & Gas Corp. 3 Goff-Arnold Land Co., elev. 2,779 ft., 2,250,000 cu. ft. gas after Sandfracing. Fifth sand 2,158 ft., gas 2,207-2,214 ft. TD 2,266 ft.

Edwin J. Fitzgerald 1 M. D. A. Cunningham, elev. 2,245 ft., 95,000 cu. ft. gas, Benson sand. TD 3,879 ft.

GEORGIA

Walker County: T. O. Posey 1 Fowley, Land Lot 270, Land District 7. Dry. TD 2,500 ft. (Cable tools.)

ALABAMA

Franklin County: J. L. Duffy and Jack Herrington 2 Bedford, C NW NE 26-8s-14w. Dry. TD 2,936 ft. Elev. 727 ft., Pennsylvanian 70 ft., Mississippian 260-70 ft.; Ordovician 2,005-15 ft.

Mobile County: Gulf Refining Co. 1 U. S. Steel Corp., 44-3s-1w. Dry. TD 8,203 ft. Elev. 33 ft., Lower Cretaceous 8,137 ft.

MISSISSIPPI

Adams County: John S. Callon 1 Butler, 15-5n-3w. Dry. TD 6,811 ft. Elev. 271 ft., Wilcox 4,720 ft., base Baker shale 6,530 ft.

Hancock County: Sun Oil Co. 4 International-Alexander, 20-9s-16w. Dry. TD 9,841 ft.

Wilkinson County: Calto Oil Co. 1-B Crosby, Lot 4, 34-4n-2w. Dry. TD 7,511 ft. Elev. 238 ft., Wilcox 5,120 ft., base Baker shale 7,898 ft.

Serio-Punches Oil Co. and Como Drilling Co. 1 Pettis, SE SW SW 25-4n-3w. IP 130 BOPD, 8/64-in., 38°, Wilcox 6,378½-81½ ft. (perforations). TD 7,208 ft. Elev. 57 ft., Wilcox 4,909 ft., base Baker shale 6,748 ft. (New field—Mills Bayou.)

SOUTH LOUISIANA

Acadia Parish: Tide Water Associated Oil Co. 1 Daigle, 83-8s-2e. IP 121 BCPD and 2,700 M.c.f. daily, 10/64-in., perforations 12,408-14 ft. TD 14,016 ft. (New pay in Church Point field.)

Beauregard Parish: John Neilson and W. E. Walker 1 Edgewood, 18-7s-9w. Dry. TD 8,000 ft.

Evangeline Parish: Vincent & Welch, Inc., 2-Marth & Fruge, 40-6s-2w. Dry. TD 8,658 ft.

Plaquemines Parish: John W. Mecom and Freeport Sulphur Co. 1-A LL&E, 31-19s-27e. IP 176 BOPD, 7/64-in., 49.3°, perforations 15,131-38 ft. TD 16,281 ft. (New pay in, and extends Lake Washington field.)

St. Bernard Parish: Union Oil Co. of California 1 State Lease 2176, Block 2, Chandeleur Sound area. Dry. TD 9,138 ft.

Terrebonne Parish: Pan American Production Co. 1 Continental Land & Fur Co., 19-18s-15e. Dry. TD 15,423 ft.

NORTH LOUISIANA

Catahoula Parish: Durbin Bond & Co. 1 Calvert-Cotton Unit, C N½ N½ 36-7n-6e. Dry. TD 6,211 ft.

Concordia Parish: Norton Oil Co., Inc. B-2 Madison Oil & Development Co., 9-6n-8e. Dry. TD 6,611 ft.

David Crow, Trustee 1 Quinn, 24-4n-6e. IPP BOPD, Wilcox 6,721-24 ft., 36.6°. TD 6,776 ft. (Extension Been Brake field).

Webster Parish: Sam E. Wilson, Jr. 1 G. T. Howell estate, C SE SW SE 17-18n-9w. Dry. TD 4,515 ft.

ARKANSAS

Columbia County: Drs. Bruce Brian and Larry Drewery 1 Jackson, C NW NW NW 10-16s-21w. Dry. TD 2,724 ft.

OKLAHOMA

Carter County: Carter Oil Co. 1 Goddard, C SW SW NW 20-4s-1w. Swab 81 BOPD, Deese 6,330-7,568 ft. TD 9,870 ft. (Oil discovery).

Creek County: J. A. Lavender et al 1 Wilinson, SE SE SW 25-15n-9e. Dry. TD 2,731 ft.

Garvin County: A. C. Cathey 1 Daniel, NE SE SW 15-2n-1e. Dry. TD 3,515 ft.

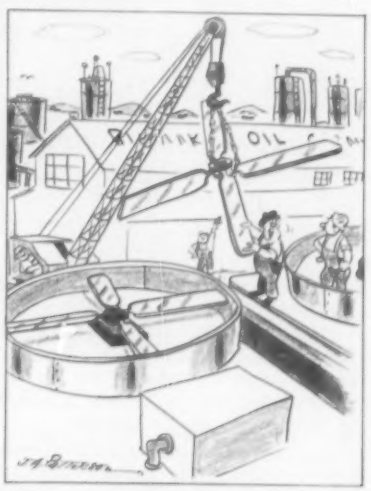
Rodgers, Inc. 1 White, NW NE NW 1-3n-3e. Dry. TD 1,809 ft.

Grady County: Graham & Folmer 1 Foreman, SW SW NE 7-3n-7w. IPF 105 BOPD, ½-in. 3,480-98 ft. TD 3,697 ft. Oil discovery).

Hughes County: Fleet Drilling Co. 1 Patterson, NE NE SW 21-5n-11e. Dry. TD 7,804 ft.

Kiowa County: Clark Development Co. 1 Meinert, SW NW NE 28-7n-20w. Dry. TD 1,600 ft.

Huval & Dunigan 1 Gilmore, SE SE NW 29-7n-20w. Dry. TD 1,356 ft.



"Believe me, I sure would like to have had this in my bedroom during that hot spell last summer!"

Logan County: Easton 1 Canada, NW NW NE 8-15n-1w. Dry. TD 6,032 ft.

Noble County: R. G. Woods 1 Pipestem, SW SW NE 19-23n-2e. IPF 89 BOPD, 3,-900-08 ft. TD 4,625 ft. (Oil discovery).

Okfuskee County: Parham & Seawell 1 Taylor, SE SE SE 15-13n-10e. Dry. TD 3,535 ft.

Payne County: J. R. McLean et al 1 Miller, NE NE SE 25-19n-2e. Dry. TD 4,185 ft.

Pottawatomie County: Johnson Gill 1 Neal, SE SW NE 6-6n-2e. Dry. TD 6,043 ft.

Rogers County: C. Coleman et al 1 Corlett, NE SW SE 12-24n-15e. Dry. TD 2,660 ft.

Washington County: Mayfield - Seigfried 1 Hatfield. IPP 2 BOPD, Mississippi lime. 1,556-77 ft. TD 1,577 ft. (Geological wildcat discovery).

KANSAS

Cheyenne County: A. J. Hammer 1 Beaumeister, SW SW NW 32-2s-39w. Dry. TD 4,717 ft.

Cowley County: Ayesh 1 Redford, SE SE NE 4-32s-7e. Dry. TD 2,955 ft.

Glickman 1 Girod, SE SE SE 21-32s-7e. Dry. TD 2,948 ft.

Rex & Morris-Seibert 1 Airport, NW NE SW 31-33s-5e. Dry. TD 3,162 ft.

Hodgeman County: Continental Oil Co.-Sinclair Oil & Gas Co. 1 Northrop, SW SW SE 16-24s-23w. Dry. TD 4,887 ft.

Kingman County: Aurora Gasoline Co. 1 Swingle, NW NW NE 12-30s-10w. Dry. TD 4,752 ft.

Lane County: Natural Gas & Oil Corp. 1 Reifschneider, SW SW SW 24-19s-27w. Dry. TD 4,790 ft.

Pawnee County: Carl Todd Drilling Co. 1 Ideker, C E½ SE SW 13-20s-19w. Dry. TD 4,255 ft.

Pratt County: Sinclair-Skelly 1 Smith, SE NE SW 17-28s-13w. Dry. TD 4,600 ft.

Stafford County: Amerada Petroleum Corp. et al 1 Parrish, NE NW SE 34-22s-14w. Dry. TD 3,955 ft.

Welch & Olsson 1 Green, NW NW SE 4-23s-13w. Dry. TD 3,865 ft.

Sumner County: Barnett Drilling Co. 1 Bell, SE NE NW 16-30s-1w. Dry. TD 3,584 ft.

Thomas County: Derby Oil Co.-Van Grisso 1 Schielke, NW NW NW 17-8s-34w. Dry. TD 4,931 ft.

NEBRASKA

Cheyenne County: Harper-Turner and Dunn & Boreing 1 Jurgens, NE NE SW 6-15n-48w. Dry. TD 4,633 ft.

Kimball County: Joseph E. Burke, Jr.-Howard Chamlee 1 McMurray, SW SW SW 25-16n-55w. Dry. TD 6,205 ft.

Midwest Oil Co. 1 Schrack, NE NE NW 6-13n-56w. Dry. TD 6,863 ft.

Sioux County: Magnolia Petroleum Co. 1 Newell, NW NW SE 17-27n-57w. Dry. TD 8,222 ft. Weathered granite.

NORTH DAKOTA

Burleigh County: Caroline Hunt Trust Estate 1 Schlabach-State, NE NE 36-139n-67w. Dry. TD 5,854 ft. Winnipeg.

Pierce County: Shell 1 Marchus, SE SE 23-157n-70w. Dry. TD 4,997 ft. Pre-Cambrian.

Rolette County, Willow Lake area: British-American 1 Wemstad, C SW SW 32-163n-73w. Dry. TD 5,274 ft. Red River.

Stutsman County: Calvert Exploration 1 Wood, SE SW 24-139n-67w. Dry. TD 3,705 ft. Pre-Cambrian.

CALIFORNIA

Fresno County: Intex Oil Co. 26-29 Benadom, NW SW 29-17s-19e, IPP 45 BO and 27

(Continued on page 164)

"Snap" Geologist

McCollum left journalism school to begin oil career

L. F. McCOLLUM, president of Continental Oil Co., might have become a famous writer if fellow students at the University of Texas hadn't convinced him geology was a "snap" course.

He first studied geology because a science course was a prerequisite to a degree in journalism, and he heard geology was easy. But the intricate study of the earth's subsurface so fascinated him that he soon switched to it as his major.

This move started him on the road to success in the oil business. Geology became the springboard which, within a few years, catapulted him into some of the most influential jobs in the petroleum industry.

His start . . . Wallace Pratt, the noted geologist, then with Humble Oil & Refining Co., gave young McCollum his first job in the oil industry. Pratt sent him to Wichita Falls, Tex., as a scout and geologist in July 1925.

Humble executives soon recognized McCollum as a man who was going places and who was in a hurry to get there. He moved on with Humble to Amarillo, Tex., then to San Antonio as division geologist.

Within 9 years, he was moved to another Standard Oil Co. (N.J.) affiliate, Carter Oil Co., as exploration manager. He became vice president of Carter in 1938, just 4 years after joining the firm. Three years later, still in his 30's, McCollum became president of the company.

In 1943 McCollum was moved again, this time to New York as assistant coordinator of all Standard of Jersey production activities. He was promoted a year later to coordinator, a position he held until accepting the presidency of Conoco in 1947.

Conoco and "Mr. Mc" . . . Under McCollum's leadership during the past 7 years, Continental has increased its annual gross sales from $228,000,000 to $476,000,000, raised its annual net crude-oil production nearly 20 per cent, and increased its land holdings for drilling purposes from 2,000,000 to more than 9,000,000 acres.

Intent on boosting Continental's stature in the petroleum world, McCollum intensified the company's research work in quest of new and better products. While decentralizing company operations, he streamlined intra-company communications and surrounded himself with bright young men who seemed to be on their way up. He takes pride in placing the right man in the right job.

"Mr. Mc," as the 52-year-old McCollum is known in Conocoland, frequently amazes subordinates with his "flypaper memory." They often find he knows more about their jobs than they do.

His efforts to keep employes happy do not stop with the vice presidents and general managers. Since he took over as president, the company has liberalized retirement and disability-benefit plans for its employes, instituted hospitalization and thrift plans, established college-scholarship awards for sons and daughters of employes, and improved recreation and safety-training programs.

Leonard F. McCollum was born in 1902 at Bradford, Tenn., but he was reared on a South Texas farm, where he got his early training in hard work.

In 1927 he married the daughter of a Texas rancher. They have two children —a son, Leonard Franklin, and a daughter, Mrs. F. Lutcher Brown.

Laurels and positions . . . McCollum is recognized as one of the top oil men in Houston, a city where big oil men are not exactly a rarity. He also has received high recognition far beyond the city limits of Houston and beyond the confines of the oil industry.

He is a member of the U. S. Department of Commerce business and advisory committee and was one of six Americans recently named by President Eisenhower to represent the Government on the U. S. commission for the bicentennial of Columbia University.

McCollum is a trustee of the Southwest Research Institute and the Institute of International Education. He also is a member of the board of directors of the American Assembly, J. P. Morgan & Co., Chance-Vought Aircraft, Inc., the American Petroleum Institute, and Texas Mid-Continent Oil and Gas Association.

He was a principal speaker last week at the annual convention of the Independent Petroleum Association of America.

E. S. Davis has been promoted to operating manager of Trans Mountain Pipe Line Co. Davis served with Imperial Oil, Ltd., in the manufacturing division before coming to Trans Mountain as general superintendent. **E. C. Hurd** has been named administration manager for Trans Mountain. Hurd supervised refinery operations for Cooperative Refinery Association, of Kansas City, Mo., and later Mercury Oil Refining Co., of Oklahoma City, before joining Trans Mountain in 1953.

E. S. DAVIS

E. C. HURD

F. Augustus Seamans has been promoted to seismic supervisor by The Texas Co. at Denver. Before his advancement, Seamans had been serving with Texaco as party chief at Elk City, Okla.

Jack E. Hughes has been named district geologist at Shreveport by Atlantic Refining Co. Hughes has been with Atlantic since 1948 and recently had been serving as assistant to the area geologist in Atlantic's Dallas office.

J. W. Healy has been appointed assistant superintendent at the Wood River, Ill., research laboratory by Standard Oil Co. (Ind.). Healy joined Standard Indiana at its Whiting, Ind., laboratories in 1947 and worked in the pilot plant division until his transfer to Wood River in 1951. **R. J. Baechle** and **W. P. Thomson** have been promoted to group leaders at Wood River.

PERSONALS

Julian W. Glass, Jr., has been named president of Panhandle Producing Co. Before his elevation to the presidency, Glass was vice president and director of the corporation.

T. W. Madsen, chemist with General Petroleum Corp., has been transferred from the company's Torrance, Calif., refinery to the new plant at Ferndale, Wash.

Dadid A. McCaulay has been promoted to research associate at the Whiting, Ind., research laboratories by Standard Oil Co. (Ind.) McCauley joined Standard Indiana in 1944 as a chemist after doing atomic research for the Manhattan project.

Don W. Heil has been transferred from the Covington, Ky., refinery to Sohio No. 1 refinery, Cleveland, by Standard Oil Co. (Ohio). Heil succeeds **William S. Schellentrager,** who has been promoted to the position of process engineering coordinator in Sohio's home office at Cleveland.

George Naff, president of Texas Eastern Transmission Corp., and **Robert Hornby,** executive vice president of Pacific Lighting Gas Supply Co., have been elected to the board of trustees of the Institute of Gas Technology, Chicago.

Robert E. Chancellor has been elected manager of exploration of Western Crude Marketers, Inc., and also of Dietler & Oleson, Inc., Inland Pipe Line Co., and Platte Transport Corp. Other promotions include: **Frank O. Prior, Jr.,** manager of production and engineering, and **Albert Solliday,** assistant to the executive vice president.

E. A. Smitherman has joined Sinclair Oil & Gas Co. in Houston as petroleum valuation engineer. Before joining Sinclair, Smitherman served with Sunray Oil Corp. in Tulsa as reservoir engineer.

William M. Satterwhite has been named district superintendent of pipelines for districts 325 and 326 with headquarters at Centralia, Ill., by Texas Illinois Natural Gas Pipeline Co. He succeeds **E. C. McCann,** who is being transferred to Geneseo, Ill., where he will be district superintendent of pipelines for TI's affiliate company, Natural Gas Pipeline Co. of America.

R.M.O.G.A. Names New Officers at Denver Meeting

Heading activities of the Rocky Mountain Oil and Gas Association during 1955 will be this group of men. Left to right are Bill Curry, Far West Oil Co., Casper, vice president for Wyoming and South Dakota; Gordon Kirby, Murphy Corp., Billings, vice president for Montana; H. H. Healy, Casper attorney, new president; W. W. Flenniken, Denver independent, outgoing president; and T. H. Hammett, Sinclair Oil Co., Denver, vice president for Colorado and Nebraska. Not shown is J. L. Dougan, Equity Oil Co., Salt Lake City, vice president for Utah and Idaho.

Gano E. Senter has been named president of Front Range Oil & Uranium Co. succeeding **G. J. Cannon,** who will remain as manager of the firm's properties.

J. B. Lassister, Jr., has joined the staff of Lion Oil Co.'s reservoir engineering department in El Dorado, Ark. He was previously chief engineer for Marine Oil Co. in El Dorado.

A. E. Pettit has opened offices in Houston as a consulting geologist. Before beginning his own firm, Pettit had been serving as assistant to the president and manager of exploration for Louisiana Land & Exploration Co. at New Orleans.

Alfred S. Grundy has been transferred by Shell Chemical Co. from its Torrance, Calif., plant to senior engineer at its Martinez, Calif., plant. **Richard E. Schramm** has been transferred from the Torrance plant to Martinez in the engineering section. **Walter E. Watters** has been moved from Torrance to Martinez in the engineering section.

DR. A. G. OBLAD

Dr. Alex G. Oblad, associate manager of Research & Development Division, Houdry Process Corp., has been elected chairman of the Petroleum Chemical Division of American Chemical Society. He succeeds **Dr. E. C. Hughes,** chief of the chemical and physical research division of Standard Oil Co. of Ohio, whose term expires September 1955.

M. M. Whitson has been transferred from assistant field superintendent of pipelines at Geneseo, Ill., by Natural Gas Pipeline Co. of America to the same position on NGPL's companion line, Texas Illinois Natural Gas Pipeline Co. Whitson has served with NGPL since 1931.

E. B. Saunders, superintendent of the southern district for Standard Oil Co. of California's Pipe Line Department, has been promoted to general superintendent of the southern district. Saunders succeeds **L. E. Joses,** who has retired. Saunders, who has been with Standard since 1935, has served with the department on organization, and with Trans-Arabian Pipe Line Co. **C. L.**

PERSONALS

Reasoner, contract superintendent, has been promoted to succeed Saunders, and **R. R. McGill** has been named contract superintendent.

Daryl Hopkins, geologist with Amerada Petroleum Corp., has been transferred to Fort Morgan, Colo., from Williston, N. D.

M. L. Newmaster has been transferred to Midland, Tex., as a gas engineer by Shell Oil Co. Before his transfer, Newmaster was a gas engineer with Shell in the New York offices.

W. C. McCammon has been named assistant to the president of Standard Oil Co. of California. McCammon joined Standard California in 1932 and served as assistant comptroller since 1944.

L. A. Dinges has been named district geologist of the northeast district of the West Texas division at Midland by Continental Oil Co. Dinges served on Conoco's geological staff at Midland before his promotion.

L. K. King has been named assistant chief geophysicist for Egyptian-American Oil Co. Before his appointment, King was supervisor in the geophysical section of Continental Oil Co., the parent company of Egyptian-American at Ponca City, Okla.

Col. Artur Levy has been named president of the government-controlled Brazilian oil company, Petrobas (Petrobas Brasilerio, S.A.) by Brazilian President Cafe Filho. Before his appointment, Colonel Levy was director of construction for the Santos-Sao Paulo pipeline system.

Jack L. Mataya, staff geophysicist, and **Jack W. Estes,** intermediate geophysicist, have been transferred from Lubbock to Tyler, Tex., by Stanolind Oil & Gas Co. The company decided to add a geophysical staff to its exploration office at Tyler to provide closer coordination of field activities of geophysical crews.

Tom L. Ingram, former district geologist at Roswell, N. M., has been transferred to Midland, Tex., as district geologist by Stanolind Oil & Gas Co. **Harold W. Sherrod,** former geologist at Midland, has been promoted to district geologist at Roswell, N. M. **Bob Byington** has been advanced to district geologist of the Albuquerque, N. M., district. Before his promotion, Byington was a geologist at Midland.

Fred D. Spindle, geologist with Ohio Oil Co., has been transferred from Lake Charles, La., to Houston.

Max A. Minnig has been named executive vice president of Witco Chemical Co. Minnig joined Witco in 1946 in the natural-gas division.

H. E. Hughes, chief engineer of Shell Chemical Corp.'s Houston plant, has been appointed to the new post of assistant superintendent-technical. **J. W. Hyde,** assistant chief engineer, has been named to succeed Hughes, **C. W. DeLong,** formerly with the head office construction group, will replace Hyde.

John H. Crump, chief geologist and development engineer with Commonwealth Gas Corp., has been elected to the company's board of directors. Crump also is a vice president and director of Southwest Gas Producing Co., Inc., a Commonwealth subsidiary.

E. J. Murdoch, former geologist and manager of exploration with Marine Oil Co., has resigned to open consulting offices in El Dorado, Ark. Before joining Marine, Murdoch had served with Atlantic Refining Co. as district geologist in Shreveport and Houston.

John W. Kirstein has been promoted to field superintendent of gathering lines for Natural Gas Pipeline Co. of America. Kirstein, who had been serving as assistant field superintendent of gathering lines before his promotion, succeeds **L. D. Williams,** who retired.

Stuart S. Umpleby has been promoted to assistant to the regional geologist at Houston by Atlantic Refining Co. Umpleby has been serving with Atlantic as a geologist at Lake Charles, La.

D. H. Trahan has been appointed to produtcion superintendent by Shell Oil Co. at Hobbs, N. M. Before his promotion, Trahan served as an engineer with Shell at Odessa, Tex.

S. R. McMurry has been appointed manager of the Ponca City, Okla., refinery of Cities Service Oil Co. McMurry, who joined Cities Service in 1924, had been serving with the company at Bartlesville, Okla., on special assignment. **D. R. McConnohie,** who was manager of the Ponca plant during McMurray's assignment in Bartlesville, has been transferred to the company's East Chicago, Ind., refinery on special assignment. **C. W. Rohler** has been promoted to chief process engineer at the Ponca City refinery. Rohler joined Cities Service in 1949, serving previously at East Chicago and Bartlesville.

Robert L. Minckler, president of General Petroleum Corp., and **Howard G. Vesper,** vice president of Standard Oil Co. of California, have been elected members of the board of trustees of the California Institute of Technology.

E. E. MILLER

E. E. Miller has been promoted to general superintendent by Tennessee Gas Transmission Co. Miller joined Tennessee in 1944 and helped to build the company's original pipeline from South Texas to West Virginia. He also assisted in starting the company's first gas measurement department. **B. R. Keller** and **L. W. A. Campbell** have been named assistant chief engineers. Keller joined Tennessee in 1943, and Campbell came with the company in 1947.

L. CAMPBELL

B. R. KELLER

Arthur S. Gale, Jr., has been promoted to chief exploitation geologist by Chicago Corp. Before his advancement, he had been serving with Chicago as division exploitation geologist at Corpus Christi, Tex.

Paul J. Dunn, Jr., has joined Oilwell Operators, Ltd., as a geologist at Calgary. Before going with Oilwell, he had served as a geologist with Williston Oil & Gas Co. at Casper, Wyo.

Al Saterdal has joined the staff of Wm. Ross Cabeen & Associates as a geologist at Denver. Before associating with Cabeen, Saterdal was with The Texas Co. at Casper, Wyo. **Charles Lydon,** former geologist with Eagle-Picher Mining & Smelting Co., has opened an office for Cabeen & Associates at Grand Junction, Colo. The company is exploring for uranium as well as for oil.

DEATHS

Dana H. Kelsey, 82, retired vice president of Sinclair Oil & Gas Co., died October 26 in a sanatorium in Garden Groves, Calif., after a long illness. Kelsey served for 33 years with the old Prairie Oil & Gas Co. and Sinclair before he retired in 1948. He was an organizer of Mid-Continent Oil and Gas Association, and in 1919 he was at an organizational meeting of American Petroleum Institute in Washington. He was honored as "grand old man" of the petroleum industry by the International Petroleum Exposition in 1948.

Clyde O. Shields, 78, veteran southwestern oil man died October 24 in a Borger, Tex., hospital. Shields was an employe of the old Prairie Pipe Line Co., and later with Sinclair Oil & Gas Co. with whom Sinclair merged. Shields was pipeline superintendent of the panhandle district for Sinclair when he retired.

A. G. Denman, 81, died at his home in Sedan, Kans. recently. Denman was associated with his brother, John Denman, Jr., in the Denman Brothers Oil Co.

J. Paul Jones, 44, assistant manager of the patent division of Phillips Petroleum Co., died of injuries suffered in a fall at his home in Bartlesville, Okla., recently. Jones had been with the research and development department at Phillips since 1934.

D. M. (Brownie) Brown, 47, production superintendent in eastern Kansas for Morris Sitrin of Tulsa, died at his home in Augusta, Kans., after a long illness.

Thomas Clyde McCobb, 71, former director of Standard Oil Co. (N.J.), died recently at his home in Southport, Conn., after a long illness. McCobb served as a director of Standard Jersey from 1934 until he retired in 1944.

Jackson R. Schonberg, 56, a staff engineer in the Esso engineering department of Standard Oil Development Co., died recently in Westfield, N.J.

Henry B. Earhart, 84, founder of the Earhart Foundation, died recently at Ann Arbor, Mich. Earhart was a director of American Petroleum Institute and several oil companies.

Paul E. Hurley, 53, manager of the Houston refinery of Shell Oil Co., died October 27 in New Orleans of a heart attack. Hurley had been with Shell for 34 years and until moving to Houston in July, he had been manager of Shell's Norco, La., refinery.

Robert LaVern Wise, 58, former construction superintendent for Phillips Petroleum Co., died October 25 in Wichita Falls, Tex. Wise, who had been associated with Phillips for 32 years, retired in 1953.

Ward R. Gregg, '32, geologist for Geophysical Services, Inc., and Texas Instruments, Inc., died in Dallas October 24. Gregg did exploratory work for the two firms in Brazil until he became ill 2 years ago.

William Metcalf Armstrong, 70, died at his home in Los Angeles October 22. He was credited with having discovered oil at Laramie, Wyo., and Lost Soldier's oil field in Wyoming.

Clyde W. Warrick, veteran employe of General American Oil Co. of Texas, died recently at Gladewater, Tex.

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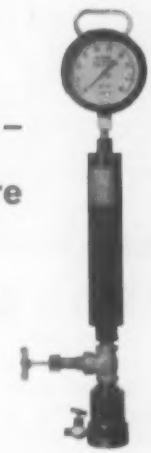

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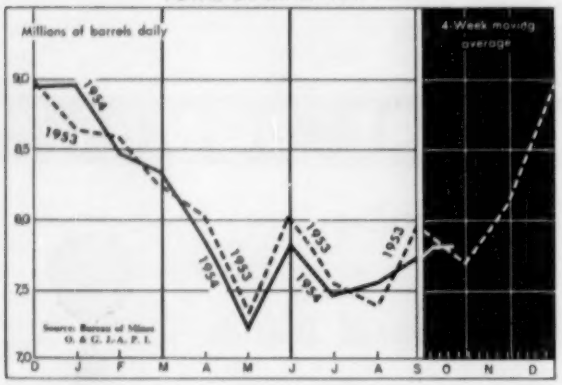
Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,184,925	DOWN	13,000	UP	140,141
Crude stocks	271,061,000	DOWN	2,098,000	DOWN	16,770,000
Completions	989	DOWN	29	DOWN	89
Refinery runs	6,928,000	UP	163,000	UP	98,000
Gasoline stocks	149,834,000	DOWN	842,000	UP	9,294,000
Four-product stocks	380,620,000	UP	1,711,000	UP	17,968,000
Total imports	1,084,000	UP	217,800	UP	232,800

TOTAL DEMAND—ALL OILS



Demand Trends Indicate Need For Shift in Refinery Yields

INDUSTRY demand statistics indicate that consumption of distillate fuels is growing at a faster rate than sales of gasoline. The recent forecast of supply and demand by the Independent Petroleum Association of America calls for a continuation of this trend in 1955.

The rapid growth of demand for distillates may force a change in the general refinery yield pattern, but it may take a general shift in product prices to produce these needed changes in refinery production.

Part of the expansion in distillate demand has been hidden by the effect of abnormal weather for the past few winters. Distillate demand for the year 1953 was up only 2.8 per cent, but the poor showing was due to warm weather in both winter quarters of the year.

Despite the warm weather in the early months of 1954, distillate demand for the year is expected to be up 5.7 per cent compared with an increase of only 1.8 per cent for gasoline. The forecast for 1955 is based on a 5.3 per cent gain for distillate compared with an increase of 3.1 per cent for gasoline.

Total gasoline demand forecast for 1955 is 15.25 per cent above the average for 1951. Distillate demand next year is expected to be up 23.07 per cent from 1951.

The increases in gasoline inventories by districts can be used to show where gasoline supplies have been more than enough to meet demands within the district.

The accompanying table gives a comparison of gasoline inventories by districts on October 22 with end-of-October stocks in 1953, 1952, and 1951. Data for the years 1952 and 1951 were added to show that a comparison of current stocks with stocks at this time last year does not give a true picture of the pressure from excessive inventories. Gasoline inventories were too high last year.

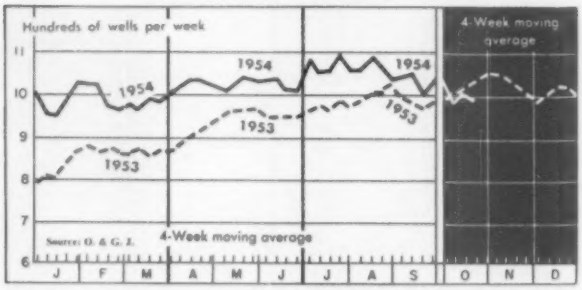
The growth in gasoline inventories since 1952 has not been evenly distributed by districts. District 2, representing about 32 per cent of gasoline production, has accounted for about 39 per cent of the increase in stocks. About 45 per cent of refinery gasoline is produced in the Gulf-East Coast districts, but only about 30 per cent of the stock increase was in this area.

GASOLINE STOCKS BY DISTRICTS

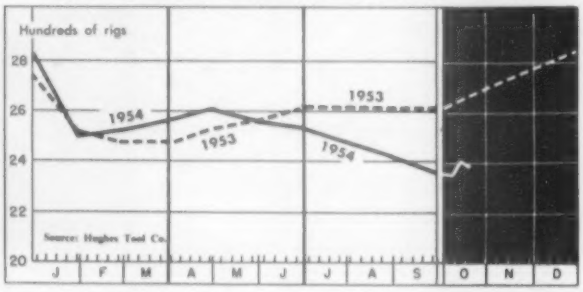
(Thousands of barrels)

	10-22-54	10-31-53	10-31-52	10-31-51
East Coast	34,242	33,880	29,511	28,258
Appalachian 1	4,255	3,520	3,877	3,430
Appalachian 2	2,167	1,908	1,659	1,721
Ill., Ind., Ky.	32,967	27,009	24,024	24,489
Okla., Kans., Mo.	13,435	14,483	11,392	11,472
Inland Texas	5,385	5,781	4,546	4,697
Texas Gulf Coast	19,839	19,721	18,598	18,139
La. Gulf Coast	9,278	7,641	6,627	6,290
N. La. and Ark.	4,111	3,741	2,526	2,576
New Mexico	236	173	107	138
Other Rocky Mtn.	5,355	4,514	2,986	2,992
California	18,564	20,048	14,209	14,662
Total	149,834	142,419	120,062	118,864

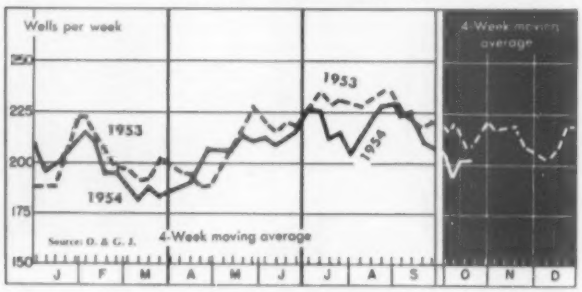
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

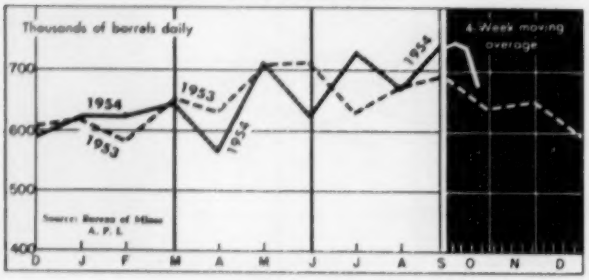
Area—	10-25-54	Change from 10-18-54	Change from 10-26-53
Gulf Coast	530	7	— 50
N. and W. Texas-New Mexico	737	3	— 81
Arkansas-N. Louisiana-E. Texas	175	4	— 9
Oklahoma	283	—17	— 50
Kansas-S. Nebraska	154	— 8	— 7
Illinois-Eastern	131	—11	— 25
Rocky Mountain	251	1	— 48
Pacific Coast	132	4	— 33
Total United States	2,393	—17	—303
Western Canada	163	12	6

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 23, 1954

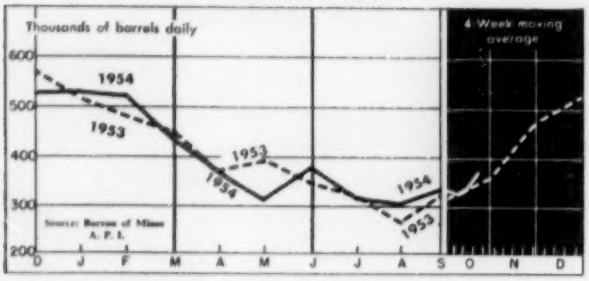
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	3	0	0	3	22,736	89	120	0	0	0	2	2	2	0	2	77	81
Arkansas	8	5	0	3	19,771	527	449	0	0	0	1	1	21	0	4	98	123
California	44	25	1	18	217,572	1,921	2,094	1	0	0	14	15	50	1	11	422	484
Colorado	17	3	1	13	84,341	1,060	573	0	0	0	10	10	28	0	15	441	484
Illinois	160	84	1	75	383,691	2,507	1,634	1	0	1	21	23	18	0	1	351	370
Indiana	14	4	1	9	19,157	643	1,045	1	0	0	2	3	9	0	1	119	129
Kansas	52	24	3	25	197,598	3,685	4,004	0	0	0	13	13	70	0	20	493	583
Kentucky	29	7	8	14	59,776	917	914	1	0	1	3	5	15	0	4	96	115
Louisiana	64	39	4	21	429,846	2,853	2,217	2	1	0	7	10	90	46	31	286	453
North	29	21	2	6	88,622	1,574	970	1	0	0	3	4	16	3	12	122	153
South	35	18	2	15	341,224	1,279	1,247	1	1	0	4	6	74	43	19	164	300
Michigan	15	7	0	*8	40,572	461	495	0	0	0	5	5	14	0	0	169	183
Mississippi	12	9	0	3	97,988	340	311	1	0	0	3	4	10	1	0	123	134
Montana	5	2	0	3	20,321	261	350	0	0	0	3	3	6	0	2	88	96
Nebraska	8	2	0	6	49,018	351	269	0	0	0	4	4	21	0	3	110	134
New Mexico	21	10	5	6	139,769	883	1,182	2	0	1	2	5	15	0	17	88	120
North Dakota	5	1	0	4	28,057	247	213	0	0	0	4	4	4	0	0	92	96
Ohio	31	10	8	†13	64,889	937	876	0	0	0	0	0	3	0	5	13	21
Oklahoma	107	63	4	‡40	379,381	7,339	6,132	5	0	0	11	16	108	3	21	538	670
Pennsylvania-New York	41	10	13	§18	141,330	1,872	2,155	0	0	0	0	0	0	0	6	33	39
Texas	316	176	10	130	1,416,989	15,057	13,948	10	0	1	76	87	641	62	142	3,410	4,255
Southwest (1 & 4)	32	16	2	14	166,857	2,128	2,275	1	0	0	11	12	91	24	38	579	732
Gulf Coast (2 & 3)	41	20	0	21	273,378	2,168	2,023	1	0	0	11	12	67	32	42	547	688
East (5 & 6)	15	8	3	4	87,112	792	667	1	0	0	4	5	16	0	13	238	267
North Central (7-B & 9)	136	67	0	69	398,916	5,651	5,292	5	0	0	36	41	291	4	18	1,367	1,680
West (7-C & 8)	75	55	1	19	425,484	3,514	3,056	1	0	0	12	13	171	0	22	607	800
Panhandle (10)	17	10	4	3	65,242	804	635	1	0	1	2	4	5	2	9	72	88
Utah	2	0	0	2	9,358	65	57	0	0	0	2	2	3	0	1	38	42
West Virginia	11	1	7	3	36,411	495	495	0	0	3	0	3	0	0	28	15	43
Wyoming	24	16	1	7	146,020	1,031	659	0	0	0	3	3	32	0	6	156	194
Miscellaneous	0	0	0	0	0	97	71	0	0	0	0	0	3	0	0	28	31
Total United States	**989**	498	67	424	4,004,591	43,638	40,263	24	1	7	186	**218**	1,163	113	320	7,284	8,880
Total previous week	1,018	533	75	410	4,252,779			30	1	8	183	222	1,139	112	313	7,098	8,662
Total October 24, 1953	1,078	572	84	422	4,326,829			19	2	9	202	232	1,182	89	303	7,467	9,041

Service wells included: *1, †5, ‡4, §8.

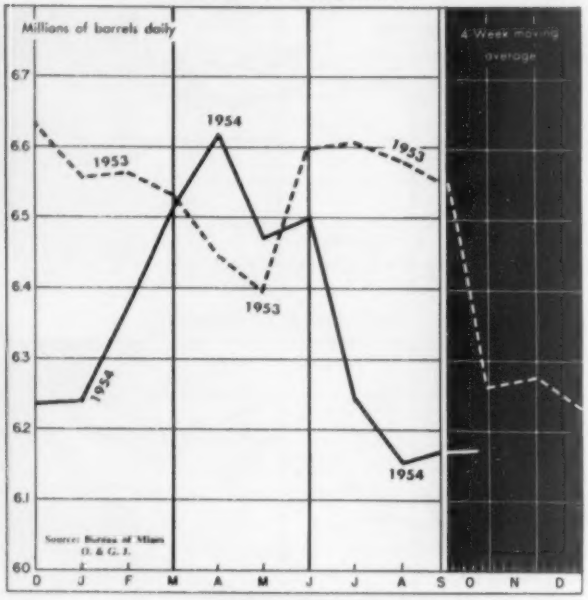
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

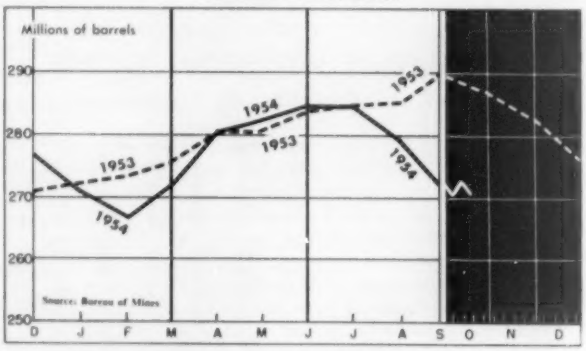


DAILY AVERAGE PRODUCTION FOR WEEK

	October 23			Oct. 16
	Crude oil	Lease condensate	Total	total
Alabama	4,200		4,200	4,000
Arkansas	71,400	400	71,800	76,000
California	960,800		960,800	961,100
Colorado	136,000		136,000	132,900
Eastern	53,500		53,500	53,500
Florida	1,575		1,575	1,575
Illinois	184,800		184,800	190,700
Indiana	29,100		29,100	28,700
Kansas	319,400		319,400	318,100
Kentucky	37,500		37,500	37,000
Louisiana	583,400	41,500	624,900	626,700
North	103,400	2,500	105,900	107,700
South	480,000	39,000	519,000	519,000
Michigan	31,400		31,400	32,400
Mississippi	87,300	3,000	90,300	91,200
Montana	40,900		40,900	41,300
Nebraska	18,800		18,800	19,200
New Mexico	204,525	2,250	206,775	206,875
Oklahoma	499,500		499,500	501,200
Texas	2,550,000	47,575	2,597,575	2,597,575
Dist. 1	42,400	400	42,800	42,800
Dist. 2	129,500	7,550	137,050	137,050
Dist. 3	398,800	22,300	421,100	421,100
Dist. 4	226,000	5,300	231,300	231,300
Dist. 5	42,500	425	42,925	42,925
Dist. 6	107,000	4,600	111,600	111,600
East Texas field	203,800		203,800	203,800
Dist. 7-B	134,000	25	134,025	134,025
Dist. 7-C	171,000	4,600	175,600	175,600
Dist. 8	820,000	2,000	822,000	822,000
Dist. 9	188,000	350	188,350	188,350
Dist. 10	87,000	25	87,025	87,025
Utah	5,100		5,100	5,300
Wyoming	255,400		255,400	257,900
North Dakota	15,200		15,200	14,400
Miscellaneous	‡400		‡400	‡300
Total U. S.	6,090,200	94,725	**6,184,925**	6,197,925
Change from previous week, down			**13,000**	
Canada	†278,800		†278,800	†295,400
Total U. S. production January 1-October 23			1,875,977,975 bbl.	
Same period last year (crude plus cond.)			*1,928,159,691 bbl.	

*Includes 26,836,350 bbl. condensate. †Week ended previous Monday. ‡Incl. S. D. 200, Nev. 200.

CRUDE-OIL STOCKS



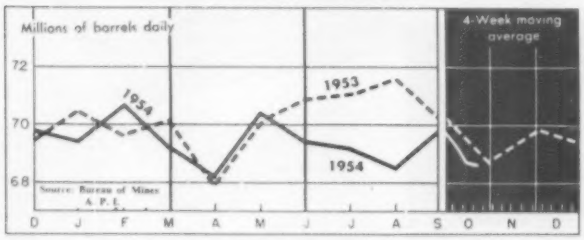
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

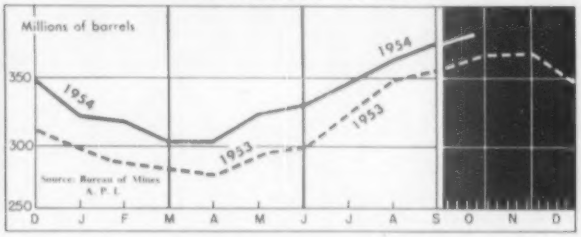
	Oct. 16, '54	Oct. 9, '54	Oct. 17, '53
Pennsylvania Grade	2,966	3,031	2,912
Other Appalachian	1,588	1,681	2,078
Illinois, Indiana, Michigan	12,569	12,480	12,058
Kans., Neb., N. D.	10,657	10,397	10,435
Oklahoma	25,169	25,769	31,848
Arkansas	3,636	3,327	3,486
Louisiana	15,055	15,704	17,244
North	2,453	2,513	2,799
Gulf	12,602	13,191	14,445
Mississippi	2,407	2,969	3,615
New Mexico	8,790	8,683	9,178
Texas	127,663	127,486	134,023
East Texas proper	10,712	10,999	12,090
West Texas	57,248	56,668	60,480
Texas Gulf	25,742	25,747	28,495
Other Texas	33,961	34,072	32,958
Wyoming	12,960	12,856	13,637
Other Rocky Mountain	5,030	5,906	3,153
California	32,026	32,388	33,358
Foreign	†10,545	11,382	10,806
Total	271,061	273,159	287,831

*Bureau of Mines. †Includes 2,830,000 bbl. in California.

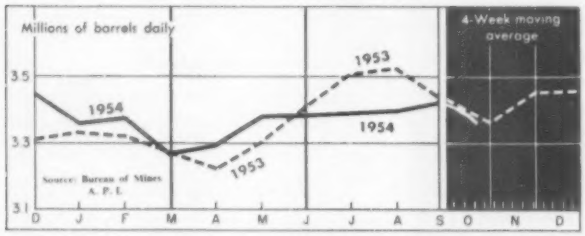
REFINERY RUNS



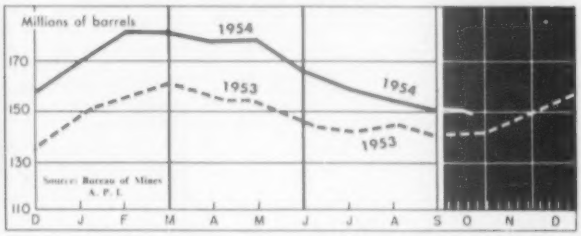
FOUR-PRODUCT STOCKS



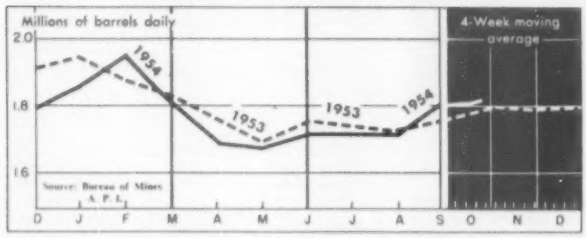
GASOLINE PRODUCTION



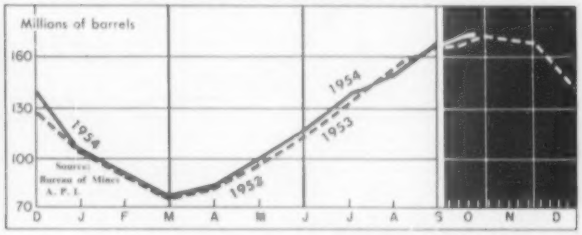
GASOLINE STOCKS



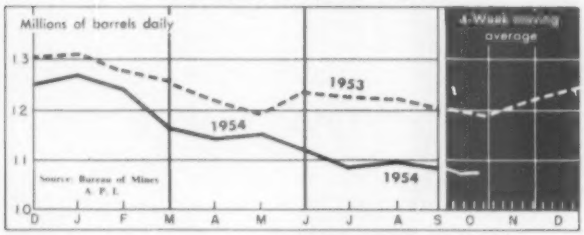
MIDDLE-DISTILLATE PRODUCTION



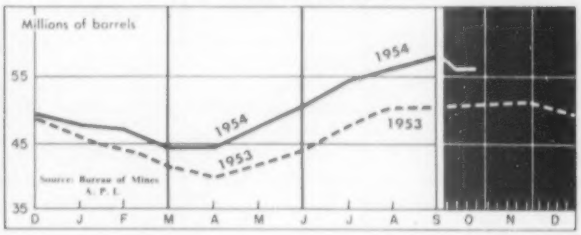
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, OCTOBER 22

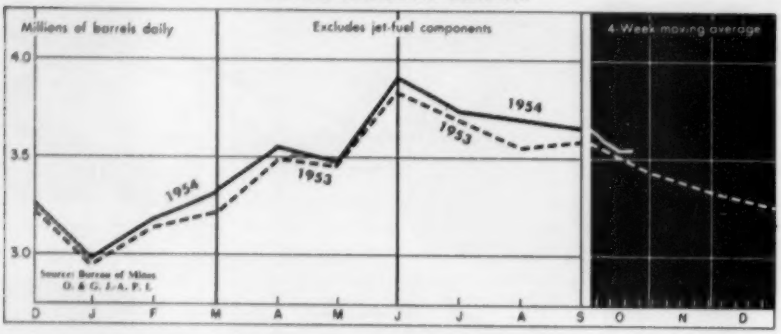
(Excludes all jet-fuel components)

(Thousands of barrels)

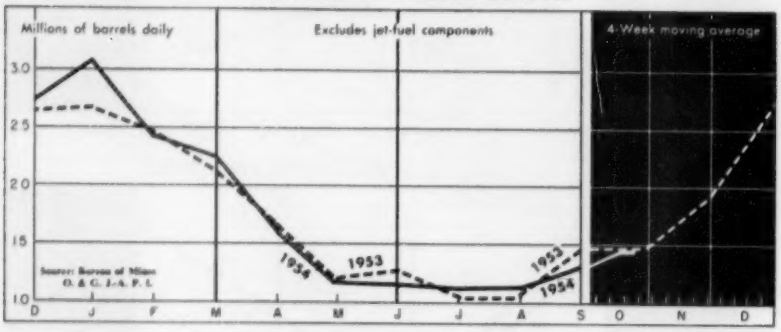
District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1953—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,045	405.7	23.0	315.7	192.8	34,242	15,448	50,952	11,151	1,009	428.7	33.8	256.1	209.9
Appalachian:														
District 1	98	39.1	4.4	21.2	4.6	4,255	824	2,849	457	109	46.2	6.2	17.1	11.2
District 2	57	27.3	3.7	13.4	2.7	2,167	460	814	313	85	46.2	4.3	13.0	12.5
Ind., Ill., Ky.	1,231	682.0	76.3	236.6	143.0	32,967	9,929	25,818	4,423	1,269	703.2	86.9	224.2	169.4
Okla., Kans., Mo.	610	340.8	13.1	152.7	42.7	13,435	2,433	13,232	1,337	565	330.7	10.6	138.9	49.0
Inland Texas	232	170.7	8.9	46.3	21.3	5,385	363	2,430	1,271	250	180.8	11.7	44.2	29.7
Texas Gulf Coast	1,727	809.6	106.4	409.1	236.1	19,839	4,379	16,942	6,096	1,639	822.9	131.5	383.8	235.0
La. Gulf Coast	584	272.6	57.1	160.3	39.3	9,278	3,392	4,879	1,237	548	273.8	53.5	150.2	43.7
N. La. and Ark.	92	35.4	7.6	22.3	6.4	4,111	1,061	1,480	141	90	38.2	7.2	20.1	7.2
Rocky Mountain:														
New Mexico	20	10.9		3.7	2.9	236		87	31	20	12.6	0.4	3.0	3.9
Other Rocky Mtn.	222	107.3	4.0	51.6	32.3	5,355	241	2,512	791	225	110.4	2.0	52.4	40.7
California	1,010	444.0	1.9	131.4	335.9	18,564	344	13,442	29,227	1,064	443.3	6.9	159.3	372.2
Oct. 22, 1954	6,928	3,345.4	306.4	1,564.3	1,060.0	149,834	38,874	135,437	56,475	6,872	3,437.0	355.1	1,462.3	1,184.4
Oct. 15, 1954	6,765	3,299.3	325.4	1,451.9	1,075.9	150,676§	38,796	133,253§	56,184					
Oct. 24, 1953	6,830	3,295.6	310.0	1,408.3	1,166.1	140,540	36,914	132,565	52,633					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines. §Revised.

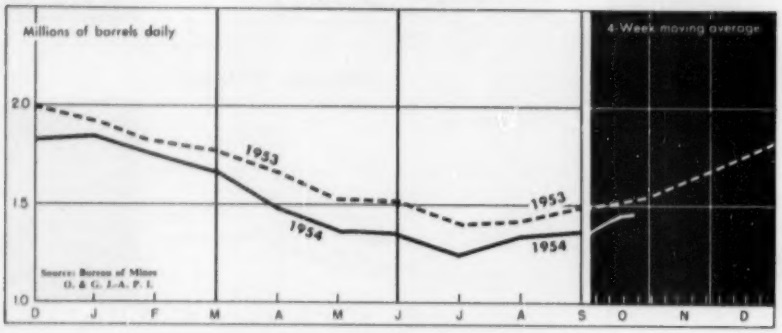
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of October 27, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	10.10	9-9.25
No. 2 straw fuel oil	8.25-8.5	9.35	8.5
No. 6 residual	$1.30-1.35	$2.25-2.35	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Cooler weather in the North Central area is increasing the movement of light heating oils from pipeline terminals. Most Mid-Continent refiners are standing firm against greater discounts on spot sales of pipeline gasoline.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 10-22-54	3,358	3,524
August 1954	3,391	3,649
October 1953	3,359	3,423
November 1953	3,444	3,330
Middle distillate:		
Four weeks ended 10-22-54	1,818	1,463
August 1954	1,755	1,173
October 1953	1,795	1,479
November 1953	1,785	1,926
Residual fuel:		
Four weeks ended 10-22-54	1,067	1,458
August 1954	1,069	1,272
October 1953	1,184	1,521
November 1953	1,223	1,654

SUPPLY AND DEMAND*

(Thousands of barrels daily)

	August 1954	August 1953
Domestic demand	7,199	7,049
Gasoline	3,555	3,445
Kerosine	200	142
Distillate	918	844
Residual	1,205	1,334
Jet fuel	150	101
Lubricants	109	118
L.P.G.	280	315
Other products	753	734
Crude loss	29	16
Exports	330	349
Gasoline	93	99
Kerosine	5	14
Distillate	50	52
Residual	67	77
Jet fuel		
Lubricants	45	38
L.P.G.	10	9
Other products	16	17
Crude	44	43
Total demand	7,529	7,398
Gasoline	3,648	3,544
Kerosine	205	156
Distillate	968	896
Residual	1,272	1,411
Jet fuel	150	101
Lubricants	154	156
L.P.G.	290	324
Other products	769	751
Crude exp. and loss	73	59
Stock change	249	797
Crude	—124	12
Products	373	785
New supply	7,778	8,195
Imports	966	946
Crude	664	672
Products	302	274
Production	6,811	7,249
Crude	6,167	6,583
Natural gasoline, etc.	644	666
Runs to stills	6,862	7,163

*Bureau of Mines

(The schedule of selected crude prices appeared on page 194 of October 25 issue and will be printed again next week.)

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FOR SALE—New drilling line—11,000 feet—6x19—type U Bethlehem improved plow steel—left lay—5,000 feet—1" dia.—6,000 feet—⅞" dia.—Also 1—used Kerotest—6x7—drilling through valve and 1—used Kerotest well head assembly. Contact M. M. Hudson, South Penn Oil Company, Bradford, Pennsylvania.

ROTARY RIG COMPLETE: 2,500 to 5,000 ft. capacity. Easily Portable. 4½-in. drill pipe. Double derrick, 7-ft. substructure, Model "S" Cardwell drawworks, 14-in. Gardner-Denver pump powered by LRO Waukesha. Located Grady County, Okla. R. V. Dillard, Phone 1177 or write Box 992, Duncan, Okla.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

USED EQUIPMENT

Franks East Texas Unit, mounted on K-10 International Truck. Located in Seminole area.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, wire or call Franks Mfg. Corporation, Box 3218, Whittier Station, Tulsa, Oklahoma.

FOR SALE EQUIPMENT

FOR SALE—In Seminole Area 8—10' x 40' riveted and welded horizontal gasolene storage tanks. Cities Service Oil. Patridge, Bartlesville, Oklahoma.

FOR SALE—Bridgeport No. 6 pumping Jack: 32 to 36 inch stroke. Beam weights, crank weights and motor base complete. Excellent condition. Price $750. Howard Gault, 915 So. Main, Ottawa, Kansas.

FOR SALE: 3600' 4½" extra hole drill pipe, good for shallow drilling, $.90 per foot. Terms. Melton Supply Company, Box 1360, Seminole, Okla.

NEW—UNUSED

1—Worthington type M-25 6⅛ x 5 x 5, two stage air cooled air compressor. Compressor operates at 870 RPM with piston displacement of 142 CFM and an actual free air capacity of 110.8 CFM at 125 PSI discharge pressure. Complete with radiator intercooler, fan, suction muffler, filter oil gauge structural steel base plate extended and direct connected through flexible coupling to General Electric 900 RPM 25 HP, 3 Phase, 60 Cycle 440 Volt, open frame induction motor.

PRICE $1,900.00

1—1½ x 2 VTE Worthington Power Pump all iron fitted with ceramic plungers. Displacement 19.26 GPM at 420 RPM at 1200 Discharge Pressure. 20 HP Motor Load.

PRICE $2,000.00

Call or write

H. K. DIXON, PLOMO COMPANY, Robstown, Texas

FOR SALE EQUIPMENT

1 CARDWELL CABLE TOOL beam type drilling-in unit complete with tool house, light plant, model 145GKU Waukesha Motor, 5" and 7" tools, and new 5,000 ft. sand and drilling lines. For inspection contact L. D. Hedrick or C. R. Moore, Great Bend, Kansas office or M. C. Hagar, McPherson office.

FOR SALE
WILSON SUPER MODEL WINCH

with Rotary drive and cathead, powered by a 140 GKU Waukesha. Unit is mounted on an LF-170 International tandem with an 8⅝" x 7" x 65' demountable, double pole mast. Complete with tools and equipment for servicing wells to 10,000 feet or drilling to 3,000 feet.

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2500 FT. FAILING rotary rig available for contract work. Production, slim hole, or cleanout. Rig and drill pipe A-1. Contact M & G Drilling Co., 1102 East St., Iola, Kansas. Phone 1979.

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FOR SALE—NUMBER ONE CONDITION

25,000'—Std. 4" Line Pipe. Machine Cleaned & Bevelled, 20 ft. Random lengths.
7,500'—7" O.D. Lapweld Casing, 20#, T&C
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This is good, used, material—priced right

STANDARD PIPE & SUPPLY COMPANY
3211 Main St. RI-1217 Dallas, Texas

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New American Wheelabrator Cabinet Roto-Grit Blast Pipe Cleaning Machine. Original cost approximately $24,000. Will sell at a substantial reduction.

This machine is designed to clean pipe from 2" to 12" in diameter in lengths from 10' to 50'. It can also be changed to handle larger sizes of pipe by increasing openings in each end.

Equipped with double wheel operation for fast cleaning, also automatic lifts, and dust disposal unit.

Machine is powered for 440-volt 60-cycle 3-phase current.

For further information phone ATlantic 1-9320 or write

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Pittsburgh 30, Pennsylvania

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NEW ELECTRIC WELD PIPE

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¼" through ⅜" wall
This is structural grade pipe in 40 foot lengths.

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FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126 Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE—15 Tank Cars 10,000 gal. insulated coiled Class III. Also 8—8000 gal. Darien Corp. 60 E. 42nd, N. Y., N. Y.

KEYSTONE 5½ SPUDDER—complete with all tools: 50 Horse Le Roi engine, butane tank, light plant and tool house. Recently overhauled. Excellent condition. Price $4500. Floyd Jackson, Rantoul, Kansas, Phone 58.

GAS COMPRESSORS: XOB I-R's, 90 h.p. Superiors, Type 80 Coopers, Type X Bessemers and Twin Clarks. Extra Cylinders. Alfred B. Kern, 227 Wright Building, Tulsa 3, Oklahoma.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses, 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

FOR SALE

4800' of 4½" OD 16.60# Grade D Drill Pipe, internal flush, Range 2, with Hughes counter bore weld tool joints. This is not junk pipe and has been checked by Sonoscope Company. 3250' #2 Sonoscope Pipe and 1554' #3 Sonoscope Pipe. Priced for quick sale—#2 at $1.30 per foot and #3 at $1.00 per foot, f.o.b. location Harvey, Louisiana. Subject to inspection and prior sale. If interested write

THE NATIONAL SUPPLY COMPANY,
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Or call Mr. McFarland—Phone 2-8101

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FOR SALE EQUIPMENT

U-15 WITH hydromatic brakes, powered by four 250 Horse Power Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars. Oilwell 14P pump, mechanical Shaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Box H-405, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPLETE RIG: New U-15 Drawworks with four 250 Horse Power Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure, 8,000 Ft. 4½" Drill Pipe, 14 new 7" O.D. x 2⅝" Bore Drill Collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 8,000-ft. well in Rocky Mountain area. Inventory on request. Box H-403, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

CANADIAN COMPANY wants line of scratchers for marketing and/or manufacture. Box H-484, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Greer Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WE PAY THE MOST for Used Line pipe, used casing, abandoned leases. Gore Oil Field Supplies. Box 1063, Tulsa, Okla.

CAST IRON PIPE, fittings, H. E. Gate Valves, new or used. Advise price and quantity first letter. R. E. Kershaw, P. O. Box 944, Muskogee, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED
Engines and Compressors

Used Cooper-Bessemer JS 8, LS or LSV units, 1,000 H.P. or over.

Used Cooper-Bessemer GMV 10, GMW or M-Line Compressors.

Box H-480, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PETROLEUM ENGINEER, 4 or 5 years experience with emphasis on valuation and Reservoir Engineering. Must be free to travel with Dallas as headquarters. Initial letter application should set out past experience in detail, education and salary requirements. Box H-485, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER

Major Oil Company in Venezuela has opening for graduate engineer (P.E. or Ch.E) with minimum 3 yrs. oil field exp., preferably in production engineering.

Extensive experience in chemical phases of production such as corrosion and scale control, salt water disposal by reinjection desired.

Write giving full details to:

P. O. Box #35, Bowling Green Station
New York 4, New York

HELP WANTED

HELP WANTED

WANTED

Sales Executive to cover Oil Industry

Outstanding opportunity for man with experience and proved record. To take charge of oil industry sales on a national basis for the most modern and complete line of Power Shovels and Truck Cranes. The man we are looking for should be familiar with producing end of industry and particularly with pipe line operations. Excellent income; permanent position.

Write giving full details: experience, personal qualifications, etc. Your letter will be held in strict confidence.

Address: **J. H. Calatane**
Power Crane and Shovel Division
Harnischfeger Corporation
Milwaukee 46, Wisconsin

WANTED: Distributor for Gas Lift equipment in Louisiana. Two territories now open are Shreveport area and Lafayette area. Prefer Engineering background but will give consideration to experience. Macco Oil Tool Co., Inc., P. O. Box 7288, Houston 8, Texas.

GEOLOGIST or Reservoir Engineer, experienced in subsurface geological work, estimation of reserves and deliverability studies required in connection with FPC hearings and financing. Age preference 35 to 40. Headquarters in Houston. Gulf Coast experience necessary. Good salary for quick worker with the required experience and qualifications. Box H-476, The Oil and Gas Journal, Tulsa, Oklahoma.

PHYSICAL CHEMIST or Physicist, Continental Oil Company, Ponca City, Oklahoma. Immediate opening for physical chemist or physicist. Advanced degree, Ph.D. preferred. Research work in Petrophysics group, Production Research Division. New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

WANTED

Tool Pusher for Colombia

Qualifications: Experienced Driller on Deep Tests.
Habits: Temperate.
Salary: Dependent on Experience.

Box H-462, The Oil and Gas Journal, Tulsa, Oklahoma.

URGENTLY NEEDED

Refinery Maintenance Supervisor

Under 45. Graduate Engineer preferred. Salary to $10,000. Must have good refinery maintenance experience. Our fee paid. All replies confidential. Send complete resume to Chas. J. Loveless Personnel Service, 616 S. Main, Tulsa, Okla. Phone 4-3193.

Engineers

Engineers with petroleum refinery operating experience. Several positions open to qualified engineers for field service duties in new refinery set-up and operations. Applicants must be willing to travel. All applications strictly confidential. Please send complete resume giving age, education, experience and salary desired to

Box H-477,
The Oil and Gas Journal,
Tulsa, Oklahoma

PROCESS ENGINEER with thorough technical training and background of engineering and operating experience with special emphasis on catalytic and thermal reforming, alkylation, and petrochemicals. Send complete record of education, experience, and minimum salary expected. Write Box H-483, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST—for supervisory position in charge of research in an expanding petroleum and research department covering all phases of production, refining and products development. Eight to ten years experience in petroleum research, preferably with administrative training as group leader or higher in a large research and development laboratory. Write fully giving technical background, experience, personal history and initial salary expected. All qualifications will be held in strict confidence. Excellent opportunity for chemist with initiative and ability. Supervisor of Employment, Ashland Oil & Refining Company, Ashland, Kentucky.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

PETROLEUM ENGINEER, 26, single, veteran, 2 years experience in foreign drilling. Excellent knowledge of Spanish and Arabic. Desire foreign career with organization offering opportunity for advancement. Available immediately. Box H-470, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT ENGINEER—fourteen years instrument experience; chemical, refinery & construction. Domestic or foreign. Available immediately. Box H-478, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPUTER, 28, single, B.S., Petroleum Geology, now employed. 3 years experience with contract crews in Gulf Coast. Desire foreign or domestic assignment. Box H-486, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited.

Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY

P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.

146 Allen Building, Midland, Texas,
Phone 2-2962.

SITUATIONS WANTED

GEOLOGIST, 32, married, no children, 5 years experience with major oil company in Rocky Mountain Area. Seeks position with small independent oil company in the Rocky Mountain Area. Box H-485, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—BBA degree accounting major familiar with drilling, production, joint interest, taxes, land and lease work, desires connection with independent. Capable of full charge of office. Age 45. W. R. Andrews, 128 Main Plaza, San Antonio, Texas.

PETROLEUM ENGINEER, 10 years varied production, drilling and management experience. Desires responsible position with independent or individual. Box H-466, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—3 years Reservoir, 1 year production experience desires position with organization offering opportunity for advancement. Box H-488, The Oil and Gas Journal, Tulsa, Oklahoma.

WELL ESTABLISHED operator desires management oil properties Rocky Mt. Area. Inquiries invited: Petroleum Assistance Company, 701 Midland Savings Bldg., Denver, Colorado.

PETROLEUM ENGINEER, 9 years experience—production, equipment, drilling, desires responsible position Denver, Colorado or Rocky Mountains. Box H-479, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED PETROLEUM ENGINEER. Extensive water flood experience with major and independent companies. Diversified primary drilling, producing, reservoir evaluation, unitization, production research, lease acquisition-supervisory and management. Desire position with aggressive company. Box H-481, The Oil and Gas Journal, Tulsa, Oklahoma.

SOIL ANALYSIS

SOIL ANALYSIS—fascinating new business. Do it yourself, write for details. Surface Oil Surveys, 1414 Electric Bldg., Fort Worth, Texas.

LEASE AND DRILLING BLOCKS

HAVE SEVERAL large drilling blocks, either for sale or to be drilled. Nothing under 10,000 acres. Two of these blocks are in the hottest county in New Mexico. Tomahawk Oil & Drilling Company, 112 8th St., N.W., Albuquerque, N. M.

RECENTLY ORGANIZED group seeking drilling deals accompanied by complete geological reports. Box H-423, The Oil and Gas Journal, Tulsa, Oklahoma.

POTENTIAL: Three wells, fourteen hundred feet deep, Archer County, Texas. One hundred thirty acres. No water. Net seven barrels, settled. Electrified. Wells eleven and fourteen hundred feet apart east and west on north line with potential oil field south. $18,000. F. T. Johnson, 2904 10th St., Wichita Falls, Tex. Tel. 2-5963.

2000 ACRES OF LEASE in old Somerset Field of Atascosa County, Texas. Thirty feet of sand. Low withdrawal to date. High residual in place. Good possibilities for secondary recovery. 1500' depth. Texas Drillers, Inc., P. O. Box 948, Seguin, Texas.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

FOR LEASE: 9 acre tract of land located at the edge of Peoria, Illinois. This property is located on a railroad and good highway. Zoned for heavy industry, will lease part or all of this tract. Box H-468, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis, Mo.

LEASE AND DRILLING BLOCKS

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

WILL BUY ⅛ interest in ⅞ drill deal on dry hole basis. Must be good. Geo., Texas, Okla., New Mexico, Wyoming. Box 22, Emmaus, Pa.

BUSINESS OPPORTUNITY

WILL MERGE GOING royalty company or accept associate with cash to expand. A. S. Berry, 817 Wright Bldg., Tulsa, Oklahoma.

REAL ESTATE

FOR LEASE—Complete 12 unit trailer camp, facilities to handle 19 man crew, includes power plant, water system, fuel storage. Cities Service Oil, Allen, Bartlesville, Oklahoma.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

BUSINESS OPPORTUNITY

We will stake the location—drill the well—put it on the pump and arrange for the sale of the crude oil.

Inquiries invited from individuals or companies desiring an experienced Drilling & Producing Oil Company to manage oil properties in the Illinois Basin.

THE NOAH PETROLEUM COMPANY
Oilwell Drilling Contractors & Producers
Citizens Nat'l. Bank Bldg.
Phone 300
Albion, Illinois

ROYALTIES

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l. Bldg., Oklahoma City, Oklahoma, Telephone REgent 6-7027.

120 ACRES WITH OIL ROYALTY—2 good houses, other good buildings, recently repaired and painted; 3 acre lake, stocked. Property partly under waterflood. Income from rent $600 year; income from oil $2200. Should increase. Price only $18,000. Clarence Coffmen, Wellsville, Kansas.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg., Tulsa, Okla.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

PRODUCTION WANTED

NEWLY ORGANIZED syndicate wants to buy 5,000 to 30,000 barrels oil monthly production. You will deal direct with principals. Prompt action. Evaluation report must accompany submittal. Box H-422, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP STICKS

KRAFTBILT ALL-PLASTIC SNAP-ON MAP STICKS: Light-weight resilient plastic clips snap maps to sticks in seconds—eliminate rolled map-handling problems. Bright colored Index Flags—plugged in one end of sticks, carry labeled identity and instantly "flag" the maps you want. Send for Catalog 352-A. Ross-Martin Co., P.O. Box 800-A, Tulsa, Okla.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for Catalog 352-B. Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

WANTED

STRIPPER WELLS, low lifting cost and substantial reserves, any number, wanted by experienced operator, reasonable. Box H-487, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING DEALS, reasonably priced, with complete, substantiated data for development by experienced group. Box 231, Scarsdale, N. Y.

LEGAL NOTICE

LEGAL NOTICE

AMERICAN AND SPANISH FIRMS TO JOINTLY CONSTRUCT SPANISH POL SYSTEM

Brown-Raymond-Walsh, Prime Contractors for the Spanish Base program, have been authorized by United States Military Authorities to establish a procedure by which they will equip, organize, and construct a P.O.L. system to serve the complex of American bases in Spain.

The general nature and magnitude of the work involved in the proposed system includes:

a) approximately 600 miles of about 10 inch diameter, welded, seamless, steel pipeline.

b) the necessary pumping stations with all appurtenances, specialties, equipment, control and communication facilities necessary to produce a multiple petroleum product, pipeline system.

c) a series of storage tank farm terminals along the transmission pipeline complete with storage tanks, distributing facilities, security and communication facilities, and all other equipment and installations necessary to produce complete storage terminals.

The procedure envisioned to accomplish this project will be to subcontract the work in one or several contracts to a joint venture organization or organizations, each composed of at least one Spanish contracting firm and one American pipeline contracting firm who must be fully prepared to equip, organize and furnish required personnel to accomplish the project in a reasonable allotted time and in a manner comparable with practice in similar installations in the United States. This method would take full advantage of the American contractors' ability to furnish specialized equipment and technically trained personnel together with the Spanish contractor's expert knowledge of local labor and other pertinent construction phases not requiring major pipeline experience.

Equipment furnished by the American contractor will be allowed to enter Spain duty-free provided it is guaranteed that the equipment will be removed from Spain upon the completion of the work. In order to met the proposed schedule the American contractor must have, and will be expected to supply from within his own organization, experienced management, technicians, certified pipeline welders, and equipment operators with the qualifications required for a comparable pipeline job in the United States. The Spanish associated contractor must be capable of furnishing skilled and unskilled Spanish nationals for all work such as building construction, transporting and stringing pipeline, and all labor operations, etc.

Proposals will be requested early in 1955 from established Spanish contractors who will be required to associate themselves with an American organization with a record of successful experience in pipeline construction. Award will be made on the basis of competitive bidding. Payment for the work will be made in both pesetas and U. S. dollars. The payment in dollars will be limited to the cost of transportation and depreciation of equipment, and the American contractor's cost for organization, overhead, profit, wages and salaries, etc. Other payments to the joint venture will be in pesetas. For comparative bid purposes only, the rate of exchange between U. S. dollars and pesetas will be fixed at the time of invitation to bid.

American contractors interested in this work and having the necessary equipment available, organization, and successful record of experience should make arrangements to associate themselves with an established Spanish contractor in the very near future. Bidders will be required to furnish a substantial performance bond.

Formal invitation to bid is expected to be available in November or December 1954. Brown-Raymond-Walsh will take no part in arrangements for Spanish-American associates; however, they will assist any prospective or interested contracting company in studies of this proposed project. Requests for information should be addressed to Brown-Raymond-Walsh, Edificio Espana, Madrid, Spain.

WILDCAT COMPLETIONS

(Continued from page 151)

BW daily, 33° gravity, perfs. 8,298-8,316 ft. in Nortonville sand (Eocene), TD 8,666 ft. (New field discovery 1½ miles southeast of Helm field.)

Richard S. Rheem, Operator 28 Rheem-Standard, 15-20s-15e. Dry. TD 7,752 ft.

Glenn County: Superior Oil Co. 1 Unit A, 16-21n-1w. Dry. TD 4,997 ft.

Kern County: Richfield Oil Corp. F-1 San Emidio, 1-10n-20w. Dry. TD 14,767 ft.

Southern California Petroleum Corp. 44-5 Brown-Pallette, 5-30s-30e. Dry. TD 4,768 ft.

Madera County: Trico Oil & Gas Co. 2-11 Stone, 11-12s-14e. Dry. TD 6,070 ft.

Merced County: Shell Oil Co. 37-2 R & R, 2-10s-13e. Dry. TD 6,200 ft.

Monterey County: The Texas Co. 1 Floyd Patterson, 20-23s-9e. Dry. TD 2,462 ft.

San Luis Obispo County: Gene Reid Drilling, Inc. 1 Hawkins, 27-27s-12e. Dry. TD 2,127 ft.

Tulare County: Fullerton Oil Co. 1 Union

Life Insurance Co., 16-24s-23e. Dry. TD 11,626 ft.
Union Oil Co. 43-26 Daniel, 26-24s-23e. Dry. TD 11,465 ft.
Ventura County: Morgan Brown 1 McMahan, 29-1n-19w. Dry. TD 6,300 ft.
Humble Oil & Refining Co. D-1 Berylwood Inv. Co., 18-2n-20w. Dry. TD 7,025 ft.
Marvel Oil Co. 1 Cuyama-Piru, 28-7n-21w. Suspended. TD 2,001 ft.
Yuba County: The McKee Co. 1 Carey, 8-14n-5e. Dry. TD 1,600 ft.

MONTANA

Hill County: DeKalb-Northern Oil Division 1 La Borta, C NW NW 5-30n-9e. Dry. TD 3,500 ft. Mission Canyon.
DeKalb-Northern Oil Div. 1 Farrington, SW NE 28-31n-9e. Dry. TD 3,713 ft. Mission Canyon.
Rosebud County, Porcupine: British-American Oil Producing Co. 1 NP-Fuller, C SW SW 21-9n-39e. Dry. TD 5,717 ft. Winnipeg.

WYOMING

Converse County, Powell area: Sapphire American Petroleums-Irving Pasternak 1-A Government, C NW NW 31-40n-73w. Dry. TD 10,188 ft. Shannon.
Niobrara County, West Cow Creek: Ohio Oil Co. 1 Umphrey, C NE NE 17-38n-66w. Dry. TD 8,915 ft.
Weston County, Kuemmerle, Bob Olds 9-1 Government-Wood-Murray, SW SW SW 9-45n-64w. Dry. TD 4,850 ft. Newcastle.

UTAH

Kane County, Mount Carmel: J. Ray McDermott 1 Government-Strat, C SE NW 19-42s-7w. Dry. TD 3,652 ft. Kaibab.
Uintah County, Wildhorse Creek: Pacific States 1 Government, C SE SE 25-14s-17e. Dry. TD 5,706 ft. Wasatch.

COLORADO

Archuleta County: Lecada Natural Gas Co. 1 Federal, NW SE NE 14-34n-6w. Dry. TD 7,860 ft. Mesaverde.
La Plata County, Bondad area: Great Western Drilling Co. 1 Spatter, NE SW SW 31-33n-9w. Dry. TD 7,661 ft. Morrison.
Logan County, Strat test: Shell Oil Co. 1 State 687, NE SW SW 9-7n-52w. Dry. TD 4,560 ft.
Morgan County: Denver Basin 1 Peterson, SE SE SW 10-2n-56w. Dry. TD 5,259 ft.
Ben F. Vaughn, Jr., and Lovemiller 1 Mellen, C SW NE 23-2n-59w. Dry. TD 6,226 ft.
Washington County: Wytex Service Corp.-Rex Monahan 1 Weninger, C NW SW 7-1n-53w. Dry. TD 5,070 ft.
Kingwood Oil Co. 1 Snyder, SE SE SE 11-2n-54w. Dry. TD 4,912 ft.
C. T. McLaughlin 1 Donald, NE NE NW 12-3s-49w. Dry. TD 3,844 ft.
Plains Exploration Co. 1 E. S. Cunning & Mathews, NE NE NE 30-4s-55w. Dry. TD 5,075 ft.
Weld County: C. T. McLaughlin 1 State, C NW SE 16-10n-61w. Dry. TD 7,511 ft.

MANITOBA

McCarty & Coleman 6-4 Dobson, LSD 6, 4-6-20w1. Dry. TD 2,367 ft.
Dome-Harris-Cox 1-10 Harmsworth, LSD 1, 10-12-26w1. Dry. TD 2,278 ft.
McCarty & Coleman 12-28 Morrice, LSD 12, 28-6-23w1. Dry. 2,541 ft.
Sapphire 4-20 West Miniota, LSD 4, 20-13-27w1. Dry. TD 2,158 ft.

SASKATCHEWAN

Hudson's Bay-Bata 4 Denzil, LSD 16, 6-39-24w3. Dry. TD 2,600 ft.
Seaboard 15-11 Devils Lake Crown, LSD 15, 11-27-6w2. Dry. TD 1,055 ft.
Sun "B" 15-18 Rover, LSD 15, 18-9-7w2. Dry. TD 4,058 ft.
Socony-Woodley-Southern 13-4 Verlo, LSD 4, 13-16-19w3. Dry. TD 3,552 ft.

ALBERTA

Socony-Cpr 18-7 Agatha, LSD 7, 18-14-11w4. Dry. TD 3,184 ft.
L.B. 1 Texaco, LSD 9, 16-51-1w5. Basal quartz gas well. TD 6,852 ft.
Hudson's Bay 1 Vilna Structure test hole, LSD 15, 18-59-13w4. Dry. TD 2,946 ft.
Nuco Fair 1 Wainwright, LSD 8, 5-46-6w4. Wainwright oil well. TD 2,238 ft.

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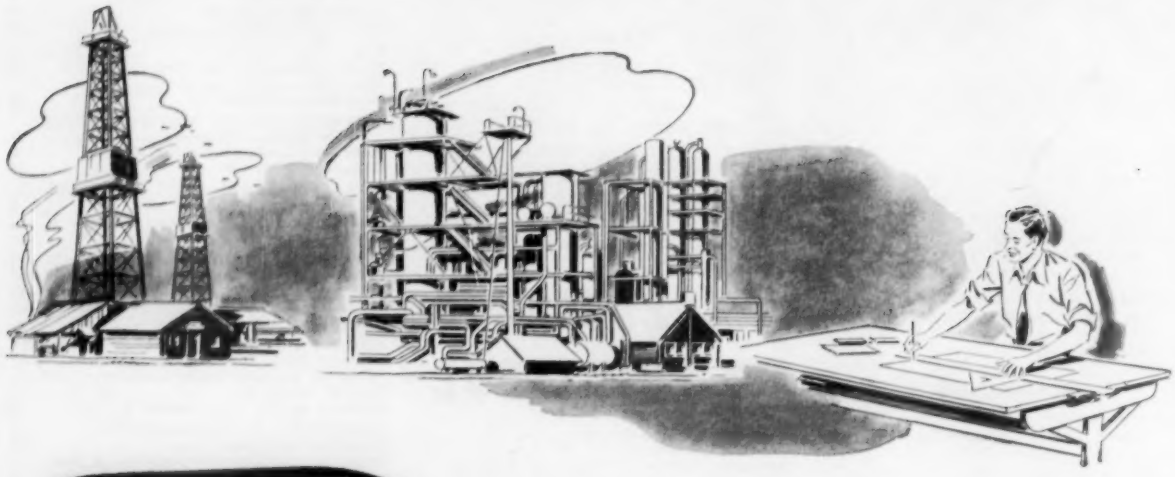
Pumps May Be Unattended

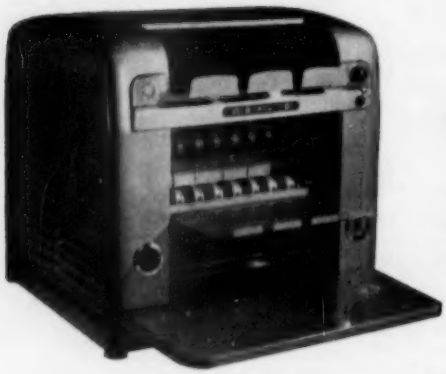
A permanent booster pump station designed for possible unattended operation later has been placed in operation by Arabian American Oil Co. at Qatif Junction in Saudi Arabia.

The station contains two centrifugal pumps driven by 800-hp. electric motors. It replaced temporary pumps which were placed in operation to boost pressure in the Tapline system and to allow increased movement of crude through the branch from Qatif to Ras Tanura.

The station is so constructed that if found desirable later remote control equipment can be added to permit operation of the facilities from Dhahran. The layout of the station will permit easy expansion if additional capacity becomes necessary in the future.

About 2 years ago Aramco placed in operation an unattended booster pump station on Wariah between Nariya and Qaisumah on the part of its system which leads into the Tapline to the eastern Mediterranean.





Ozalid...

speeds information to the field, office, plant!

Because fast distribution of drilling, production, and marketing records and reports is so essential, more and more oil companies are taking advantage of Ozalid's copying versatility.

Ozalid is the clean and quick process that easily copies anything typed, drawn, printed, or written on translucent paper, cloth, or film. There are Ozalid machines to fill your needs for copies of maps, logs, reports and recordings in plant, office, or in the field.

Ozamatic (above) is table top size, moderately priced, handles materials up to 16 inches wide, any length, makes up to 1,000 copies an hour.

Bambino (right) is the smallest and fastest, low-priced white print machine, will make up to 200 copies an hour of materials up to 9 inches wide, at less than two cents a copy.

With Ozalid copying you eliminate the need for inks, stencils, carbons, darkrooms, and messy developers . . . and are always assured of exact copies, as many as you need, clean, dry and ready for use.

For information, call your nearest Ozalid distributor *(see phone book)* or write 851 Ozaway, Johnson City, N. Y.

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Hortonspheroids are especially well adapted to the storage of motor gasolines and natural gasoline. They are available in standard capacities from 2,500 to 120,000 bbls. and for pressures from 2½ to 100 lbs. per sq. in. Write our nearest office for information, estimates or quotations.

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This Gray Wolf rig, working near Kountz, Texas, has an Emsco GB500 draw-works. J. R. Casparis, tool pusher, says, "We get good, long and trouble-free service from our Yellow Strand lines."

"EASY TO RIG...HARD TO WEAR OUT"

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The bit of this rotary is turning at the 3500-foot mark and it has a long way to go to pay dirt. The rig, owned by Gray Wolf Drilling Co. of Houston, Texas, has been working steadily on a contract near Kountz, Texas.

This rotary, like most of the Gray Wolf rigs, is equipped with Yellow Strand lines. The main line is 2500 feet of $1\frac{1}{8}$" Yellow Strand Preformed Drilling Line; tong line is $\frac{5}{8}$" B & B Plow Steel; and a $\frac{3}{4}$" B & B rope is used as a core line. The Yellow Strand has just the right flexibility to make stringing up easy and fast, yet there's plenty of strength and fatigue resistance for many extra ton miles of service. It spools fast and even for smooth round trips.

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